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CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICE—
Annual Meeting, New England Association of Gas Engineers..... 69

EDITORIALS—
Briefly Told..... 69
Arc Lighting at Boston, Mass.—The Amendment was not Accepted by the Gas Company—An Application for an Opposition Charter at Freeport, Ills.—Suit for Damages—Processes and their Development in England During 1889.

CORRESPONDENCE—
Dr. Wilkinson Objects to the Figures..... 70
The Market for Gas Securities..... 70
*Another Step in the Granger Process..... 71
Pressure Gauges and Exhaust Registers..... 71
*The Alexander and Paterson Process of Making Oil Gas..... 72
The Illinois Coal Industry..... 73
Methods of Lighting Work on the New Croton Aqueduct..... 74
*Former for Square Pipe..... 75
The Lighting of an Imperial Railway Train..... 75
Electric Lighting of Ships..... 75
Conversion of Gas Globes into Regenerative Lamps, by D. R. Gardner..... 75
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 77
Progress at Poughkeepsie, N. Y.—A Hint from Eufaula, Ala.—Changes at Cumberland, Md.—Mr. Cabot at Home Again—Contracts Awarded to Mr. Weber—An Electric Freak at Birmingham, Ala.—Bids for Public Lighting, Brooklyn, N. Y.—Public Lighting, Boston, Mass.—Can the Successful Contractors Carry out their Promise?—Experimenting with the Gordon Lamp, Troy, N.Y.—Gas Company for Monterey, Mexico—Main Extensions at Savannah, Ga.—Asking for Another Investigation at Washington, D. C.—Cost of the Eight Hour Labor Proposition, Philadelphia, Pa.—Cincinnati to Have an Electrical Engineer—Mayor Davidson and the Baltimore Consolidated Company—Annual Election, Laclede Gas Company—Quality of Philadelphia Gas—Proposition to Regulate Gas Rates in St. Louis—Breckenridge Cannel for Rio de Janeiro—Cheaper Gas for Galesburg, Ills.—Annual Meeting, Peoples Company, Cleveland, O.—Annual Meeting, White Plains (N. Y.) Company—And Many Other Items.
Corrosion..... 79

It is with sincere regret that we announce the death of Oliver E. Cushing, Agent of the Lowell (Mass.) Gas Light Company, who died Friday, 17th inst.

[OFFICIAL NOTICE.]

New England Association of Gas Engineers.

SECRETARY'S OFFICE, BIRMINGHAM, CONN., Jan. 10, 1890.

The Twentieth Annual Meeting of the New England Association of Gas Engineers will be held at Young's Hotel, Boston, on Wednesday and Thursday, Feb. 19th and 20th. The meeting will be called to order on Wednesday, at 10 A.M., by the President, Mr. R. B. Taber.

At the present moment it is impossible to give a list of the papers which will be read at the meeting, but it is hoped that the literary part of the programme will equal any of those held in past years.

Persons eligible for membership who desire to join the Association will please communicate with the Secretary, who will forward at once blank form of application. CHARLES H. NETTLETON, Sec'y.

BRIEFLY TOLD.

ARC LIGHTING AT BOSTON, MASS.—Our item columns contain an account of the award for public lighting by means of arcs in Boston for the current year, the bulk of which is to be performed by the Suburban Light and Power Company, at its bid of 39.74 cents per night per light for city proper, and 39.99 cents for the Roxbury district. The Boston Electric Light Company refused to tender for the work because the new set of specifications provided that the maximum rate that would be considered should not exceed 40 cents per light per night, the refusal being based on the fact that at the maximum rate the Company would not be serving the interests of its stockholders did it attempt to secure the work. The Charlestown Gas Company, that had been performing the arc lighting for the Charlestown district, also refused to tender, and for similar reasons to those submitted by the other Company; but we understand that the Charlestown proprietors have reconsidered their former determination, and have since agreed to go on with the lighting of the district at the rate of 40 cents per arc per night. This later action we presume may be fairly taken as indicative of the fact that the Gas Company can supply electric currents for lighting more economically than can be done by an independent Company. But be this as it may, we are just now more concerned with the reasons put forward by President Gilbert, of the Boston Electric Light Company, in defending, or rather explaining, his action in the matter of refusing to submit a tender. Having asserted that the officers and directors of the Company proposed to do all in their power to protect the amount of money invested by the stockholders in their business, he stated that he was perfectly willing to leave the settlement of a contract price to the decision of the State Board of Gas and Electric Light Commissioners, or would consent to an inspection of the Company's books by an expert or experts to be named by the Mayor, and abide by the result. Continuing, President Gilbert said: "If Mayor Hart had removed the restriction of a 40-cent limit, the Company could have put in a bid of 50 cents for districts where the housetops are wired, and for the remaining circuits an offer for a lower figure could have been made that would have brought the total average expense below 50 cents a light per night. At present it costs the Company 47 cents per light to illuminate the streets, hence, and simply from a business standpoint, the Company could not make an offer of 40 cents, on the basis more particularly of a yearly contract." From President Gilbert's statement it would seem that arc lighting (that is, where a fair attempt to keep up to the candle power named in the specifications is the rule) is not a great bonanza at rates that are even largely in excess of many now maintained at various points in the country. President Gilbert's statement, in any event, has the merit of being plain, if not blunt.

THE AMENDMENT WAS NOT ACCEPTED BY THE GAS COMPANY.—The following item was printed in our issue for January 13th: "The Pawtucket (R. I.) Common Council has amended its contract for public lighting with the Pawtucket Gas and Electric Light Company so that the 2,000-candle power arcs now supplied on the all-night schedule may be changed to half arcs." Naturally this conveyed the intimation that the ordinance or agreement had been adopted by the Council and accepted by the Company. This, however, was not the result; the amendment

or order was only introduced, and the Gas Company negatived the proposition.

AN APPLICATION FOR AN OPPOSITION CHARTER AT FREEPORT, ILLS.—At a meeting of the City Council of Freeport, held on the 6th inst., Clerk Osborne read a lengthy ordinance, based on a proposition from Nathan Shelton, regulating the acts and prospects of an opposition gas company. The promoters propose to supply an uncarbureted fuel gas, under the Evans process, and to charge the consumers for it at the rate of $1 per 1,000. Ald. Holland, immediately on the reading of the proposition, after asserting his belief that such a measure should receive careful attention, moved that a committee of three, acting in conjunction with the Mayor, should be appointed to sift the matter thoroughly. This opinion was concurred in by the Council, and the Mayor appointed Messrs. Holland, Brunn and Flachtmeir as such committee. The Freeport Gas Light and Coke Company charges from $1.80 to $2.25 per 1,000 cubic feet for a good quality of illuminating gas, and its service so far has given good satisfaction to the residents. We imagine, however, that if the Council Committee gives the proposed ordinance a careful scanning, and goes thoroughly into the aims and objects of those who are backing it, the project will not be indorsed by the authorities.

SUIT FOR DAMAGES.—In the suit of Mr. J. S. Brown, of Bishop street, Montreal, who asks for $800 damages against the Gas Company, alleging that his family's health was injured because of gas that escaped into his residence from a fractured street main, defendant has called the city into the case to guarantee it against the outcome of the suit. This is asked for because the main in question was fractured by the impact from a heavy steam roller used by the city in the operation of macadamizing Bishop street.

PROCESSES AND THEIR DEVELOPMENT IN ENGLAND DURING 1889.—In its retrospect for the last year, the London *Journal* thus makes mention of certain new processes and inventions in the gas industry:

"A fair number of new processes and inventions in connection with gas making have attracted public attention during the past year. There has been a distinct revival of speculation in new or ostensibly novel descriptions of illuminating and fuel gas. To say little of such devices as the Lawrence automatic gas, which is simply gas carbureted with petroleum spirit, or the Lothammer gas, which is carbureted under pressure with the same material, notice must be taken of the remarkable 'boom' in water gas, which was secured by the clever financial operations of the promoters of the British Water Gas Syndicate. The £5 shares of this venture (£3 paid) were at one time forced up to £26; and two concessionary companies were launched before the bubble collapsed. The question of the possibility of utilizing water gas plant as an auxiliary to the coal gas plant in British gas works, previously regarded as impracticable on the score of expense of production, was seriously raised towards the close of the year, when the Directors of the Gas Light and Coke Company sent their Chief Engineer (Mr. G. C. Trewby) to the United States to inquire into this and other matters of which American gas engineers have special knowledge. Several American gas engineers of experience in water gas manufacture came to this country about the same time with a view to demonstrating the practicability of making carbureted water gas here at a cost comparable with that of ordinary coal gas. It was reported that at least two, and perhaps more, of the London Gas Companies contemplated putting these claims to the proof of experiment on a working scale; and a working water gas plant has actually been erected by the Van Steenberg syndicate at Humphreys' Hall, Knightsbridge. Meanwhile pressing labor troubles caused attention to be given in increased measure to devices for reducing the handiwork of coal gas manufacture. Favorable notice was taken of the inclined retort settings of M. Coze, of Rheims, the successful working of which with English caking coal was proved to the satisfaction of a deputation of representative English engineers who visited Rheims for the purpose. M. Coze's success has already attracted a host of imitators, with whom he will probably have to fight for his profits if his system, or anything like it, should be generally adopted.

"The Dinsmore process of improving coal gas by carbonizing the tar has been partially adopted at Widnes, and is being experimented with in some other places. Mr. Valon, at Ramsgate, has developed a process for the production and use of pure oxygen in gas purification, by an ingenious modification of the Brin process for separating oxygen from the atmosphere. The Claus system of continuous gas purification by liquids in closed vessels was adopted at the Belfast gas works and used successfully for 72 days, when there was a complete breakdown of the pumps attached to the apparatus, which proved to be of unsuitable pattern. The capability of the plant, when in proper order, and the reliability of the system for dealing with a daily make of 1,600,000 cubic feet of gas, were, however, established; and the apparatus is shortly to be started again with new pumps. The interesting problem of dispensing, wholly or in part, with the lofty side-framing of gasholders, received further elucidation from the continued success of the Rotherhithe experiment, in which a triple-lift holder has framing only to the height of the second lift. The example was followed in designs for enlarging several other holders belonging to the South Metropolitan Company. Mr. W. Gadd, of Manchester, brought out a patented invention for guiding gasholders from the base, which was to be tried on a holder not yet finished, at Northwich. Mr. E. Lloyd Pease, of the firm of Messrs. Ashmore, Benson, Pease & Co., of Stockton, patented a system of rope-guiding for gasholders, which was tried with success on a holder at Haslingden."

The Market for Gas Securities.

During the week the market for city gas shares was strong even to buoyancy, although the actual number of transfers was not exceptionally large. Consolidated sold up to 96¾, and then reacted somewhat, but at no time did it go below 95¼, the highest point of the previous week. To-day (Friday, Jan. 17) opening sales were made at 95¼, and some brokers predict that lower figures will be recorded. We, however, do not share this belief, unless a considerable disturbance in the loan market takes place. Other city shares are also strong.

Brooklyn shares are well up to the mark, with every indication that important developments in respect to consolidation of interests will shortly take place.

The event of the week in New York proposed gas legislation was the introduction by Senator Roesch, on the 16th inst., in the State Senate, of a bill amending the gas companies' act to the extent of empowering gas companies to borrow money to pay debts or extend operations by bonds issued on franchise or property, not to exceed in amount the capital stock, the issue to be made only with the consent of two-thirds of the stockholders.

In out-of-town shares the most notable showing is made by the Consolidated Company, of Baltimore, the bid rate having been advanced thereon to 55, holders offering at ½ point higher. This is an advance of 5 points for the week.

Bay State (Boston) common is inquired for at 23, while Laclede common is offered at 18¼. Chicago Trusts are at 46 bid.

It is likely that American capital will be invoked to carry out the provisions of a franchise recently granted by the authorities of Monterey, Mexico, for the operation of a gas works at that point.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Dr. Wilkinson Objects to the Figures.

NEW YORK CITY, Jan. 11, 1890.

To the Editor AMERICAN GAS LIGHT JOURNAL:

My attention has been called to the article "A Question and an Answer," in your JOURNAL, December 9th, 1889.

Mr. Smithson does not give you the whole story as to what the new gas company propose to do. In the first place, they have a complete coal gas plant of sufficient capacity to make coke for the balance of the works, which will consist of a process of "wood water gas," so successfully used for several years at the New York Mutual Company's works. We there found that wood of no matter what kind, oak, chestnut, pine (fat or lean), hemlock, bark, etc., would in every case produce the same number of cubic feet per pound; the average for the whole time being 55,000 cubic feet per cord.

The process is patented, and has not been used in works named by you. It is entirely different in working and results from the usual wood-gas making; hence the figures you give do not apply. We all know what Australian shale will do as an enricher, and the figures you quote have been far exceeded by the process we propose.

Again, it is by no means certain that we shall use shale; for I have before me a sample of oil that can be had in any quantities—1,000 barrels per day, if wanted—delivered in San Francisco at a price that will enable the company to deliver gas (of 25-candle power) in holder at about one-half the price named by you.

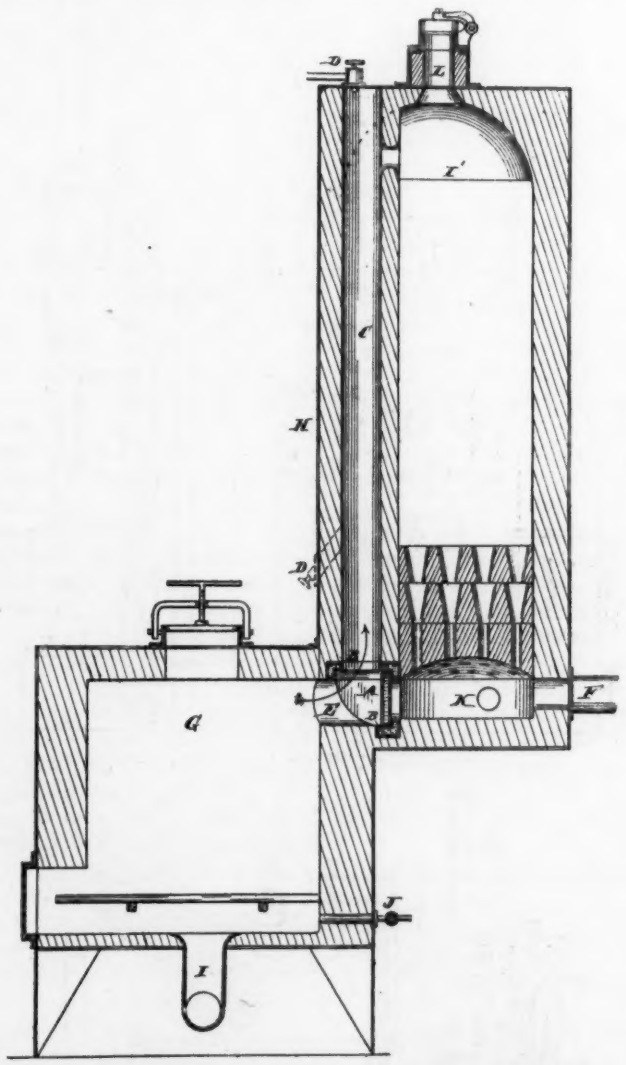
As a rule, I do not answer such statements; but when I have the figures of actual work I feel it a duty to give them to the profession.

A. W. WILKINSON, M. D.,
Chemist to the Mutual and Equitable Gas Light Companies, N. Y. city.

Another Step in the Granger Process.

Letters patent (No. 418,711) were granted, on January 7, to Arthur O. Granger, of Philadelphia, for an improvement in a gas making process, the apparatus for which was patented by him on January 9, 1885, the serial number of the patent being 152,385. The specification submitted with his latest effort is as follows :

My invention has reference to a process for the manufacture of water gas ; and it consists in first heating up a bed of carbon in a generator, and with the products of combustion therefrom heating up a superheater or fixing chamber by internal combustion, then passing steam into the bed of carbon producing water gas, then passing the water gas, mixed with carbureting fluid, through the superheater, entering at the end where it is least hot, and causing it to pass through the superheater, gradually entering a zone of greater temperature, until it finally escapes to the washer or holder from the end which is hottest, as is fully set forth in the following specification and referred to in the claim.



The object of my invention is to insure the illuminating gas passing into the superheater, at least the hot portion, and leaving the same at its hottest part, by which the thorough decomposition and fixing of the gases result, and at the same time the production of lampblack is entirely overcome. In apparatus in which the hydrocarbon vapors or liquids are caused to enter the superheater at its hottest portion part of the hydrocarbon is instantly converted into lampblack and fixed upon the filling or lining of the superheater. By overcoming this production of lampblack I greatly increase the production of illuminating gas, as well as improve the working of the apparatus.

In the drawing is shown a sectional elevation of water gas apparatus in which to carry out my improved process.

H is a superheater, and *G* is a generator, which are connected together in any suitable manner, as by the connecting flue or passageway *E*, which opens from the top of the generator into the bottom of the superheater, or by an auxiliary flue connecting with the upper part of the said superheater. The generator is provided, as usual, with the blast pipe *I* and the steam pipe *J*, preferably entering below the grate bars.

The superheater *H* is provided with a lower combustion chamber *K* and auxiliary flue *C*, connecting the flue *E* with the upper part of the said superheater and above the filling *F*.

A is a water-cooled valve and works on the water-cooled seat *B*, and is adapted to close the entrance to the chamber *K* or the flue *C*, by which the product from the generator may be caused to pass either into the chamber *K* or the flue *C*, as desired, thus causing the said products to pass into the top or bottom of the superheater.

L is the smoke outlet opening from the top of the superheater, and *F* is the gas outlet opening from the chamber *K* and connecting with the usual water seal or washer.

D is the hydrocarbon spraying nozzle, which admits hydrocarbon fluid into the upper part of the superheater, preferably where the water gas, which passes through the flue *C*, enters the superheater. If desired, the fluid hydrocarbon may be admitted anywhere in the flue *C* or in the superheater proper, or it might be admitted in the generator.

In making gas the valve *A* is turned up, so as to close the flue *C* and open the passageway from the generator into the bottom of the superheater or its chamber *K*. The smoke outlet *L* is opened and the blast from pipe *I* is turned on. The coal in the generator is brought to incandescence by the blast from the pipe *I*, and the products are caused to pass into the chamber *K*, and are burned therein, the products therefrom passing up through the filling or internal brickwork of the superheater and escaping by the chimney outlet. The air blast from pipe *I* is then shut off, chimney *L* is closed, and valve *A* turned so as to close the entrance to the chamber *K* from the generator and open the auxiliary flue *C*. Steam is then admitted from pipe *J*, which, in passing up through the generator, is decomposed, forming carbonic oxide and hydrogen, which are conducted up through the flue *C* to the upper end of the superheater, where they are preferably brought in contact with a carbureting fluid from nozzle *D*, and the mixed gases then pass down through the superheater, entering that portion thereof which is least hot and emerging from that part which is hottest, becoming thoroughly incorporated and fixed into an illuminating gas, which then passes off by flue *F* through the usual water seal to the holder, if desired, preferably passing through purifying apparatus before reaching the said holder.

If desired, the auxiliary flue *C* might be separate and distinct from the superheater and built in the form of an external tube, and in place of one valve, *A*, two valves may be used, one controlling the entrance to the bottom of the superheater or chamber *K*, and the other the auxiliary flue thereof ; and it is evident that the smoke outlet might be from pipe *F* and the gas outlet from *L* ; but of course in this case the hydrocarbon nozzle *D* would be located at the bottom of the superheater or in the chamber *K*, the principle involved being identical with that hereinbefore described.

It is immaterial to my invention what the construction of the generator may be or what location may be given to the gas outlet or the steam and blast pipes.

Pressure Gauges and Pressure and Exhaust Registers.

W. Ralph Herring, in his articles on the "Construction of Gas Works," now running in the English *Gas Review*, makes the following remarks on the pieces of apparatus mentioned in the headline:

Pressure Gauges.—Gas as generated from the coal during the process of destructive distillation when subjected to the ordinary pressure existing in the apparatus of gas works, assumes a volume about 380 times greater than the coal from which it is extracted; and this volume is capable of augmentation and diminution by the effect of the variable atmospheric pressure and temperature. For the purpose of appreciating the various pressures to which the gas is subjected in the apparatus on the works, the water gauge is employed, which, in its simplest form, consists of a glass tube of about five-eighths of an inch internal diameter, bent in the form of a letter U. This tube is half filled with water, and a scale divided into inches and tenths of an inch is placed between the two tubes. One of the ends of the tube is covered by a perforated cap, while the other is made to communicate with the apparatus it is intended for. The gas pressure will depress the water in the tube to which it is connected, and raise it in a corresponding degree in the other tube; and the distance between the two levels indicates the pressure, which up to two or three inches is generally described in "tenths," and above this amount the term inches is applied.

The tubes are usually of equal diameter, so that the depression in one is equal to the rise in the other; but when two tubes of unequal diameters are employed, such as when a small tube is placed inside a larger one, the depression and elevation of the liquid is in proportion to their respective areas. At one period, when the baneful effects of heavy pres-

sure were not understood, it was by no means unusual to find a pressure of 30 or even 40 inches in some works, occasioned by small or choked mains and by defective purifiers. In these cases mercurial pressure gauges were used, which are similar to the water gauge, but having tubes of only a quarter of an inch in diameter, and as mercury is about thirteen and a half to fourteen times heavier than water, these gauges were made proportionately shorter. Thus a column of 30 inches of water would be substituted by a mercurial gauge of 2¼ inches in length; but, with the advanced knowledge now prevailing, such pressure should never exist; at the present time, therefore, the mercurial gauge is no longer in requisition, and any slight varations in the pressure are not nearly so well indicated by this as with the water gauge.

If tubes of unequal area are employed—say the one of ten times larger sectional area than the other—the water will be depressed nine-tenths in the smaller, and elevated but one-tenth in the large tube, and, by taking advantage of this circumstance, the pressure gauge can be made to indicate with one tube only, which in some cases may be desirable.

In all the various parts of gas works, whether in the retort house or on the apparatus, the simple tube gauge is preferable to all others, as there is no likelihood of its being disarranged, whereas with other descriptions, if the water is not maintained strictly at the level, or when roughly handled, they are liable to mislead. By means of the gauge we are enabled to know the exact pressure existing in any part of the works, and from this ascertain the existence of any obstruction, either in the connections or in the apparatus, and stoppages in the district mains are, likewise, readily detected by its aid.

It is, for the before-mentioned reasons, important that a pressure-gauge be fixed to the inlet and outlet of each piece of apparatus through which the gas has to pass. In some cases, such as the washers, and more particularly the purifiers, one gauge on the inlet of each is sufficient, as the difference between the one and the other indicates the pressure.

Pressure and Exhaust Registers.—The principle of the action of these instruments is the same as that of the foregoing, with the important difference in make that they record as well as indicate the pressure or exhaust, as the case may be. This is accomplished by means of a float in water to which a vertical spindle is attached, having a lead pencil at the upper end, pressing upon a cylindrical graduated roll of paper upon a drum which is caused to revolve by clockwork once in the twenty-four hours, the paper roll being renewed daily.

The exhaust register should be connected to the mains at a point on the inlet side, and the record shows exactly whether the exhauster has been kept working with regularity.

The pressure register is in communication with the street mains, beyond the governor, and records the various pressures maintained therein during the day and night. The difference between the exhaust and pressure registers is simply one of detail in construction.

King's pressure-gauge works on somewhat the same principle, viz., a float in a suitable vessel of water. A cord is attached to the float, and passes over a small pulley on a spindle running in roller bearings. On one end of the spindle is a fixed pointer, which moves in front of a semi-circular dial, on which are inscribed very fine divisions indicating the pressure according to the rising or falling of water line caused by the pressure of the gas. This gauge indicates much finer variations of pressure, but is not used much, except when in skilled hands, as the loss of water by evaporation requires to be constantly made up, otherwise the indicators would be incorrect. This disadvantage has been quite recently overcome by the introduction of Messrs. Harrison and Sheard's patent mercurial gas pressure-gauge, Messrs. W. and B. Cowan (of Smith Square Works, Westminster, S. W.) being the manufacturers. It is a most convenient and portable appliance, and is constructed on the principle of the "King's" gauge, but with mercury to operate the float instead of water, thus absolutely overcoming the difficulty of loss by evaporation. To the float is attached a small spindle, on the upper end of which is a rack, which actuates a pinion on the pointed spindle. The dial can, when required, be made to indicate vacuum and pressure. The top of the float-chamber is arranged in such a manner that even if the gauge were turned upside down the mercury could not escape, thus allowing the instrument to be carried from place to place without fear of derangement. This is a very valuable instrument, and one that should be in the hands of all gas managers. I see no reason why the principle of substituting mercury for water should not be applied to the gauges on jet photometers, as now, with water, and in hot rooms, the level of the water requires constantly adjusting, and one can scarcely even look at the jet without the question presenting itself to the mind, "Is the water-line right?"

The Alexander and Paterson Process of Making Oil Gas.

Letters Patent (No. 419,098) were granted on the 7th inst., to Messrs. Thomas and Samuel Alexander, of Kirkintilloch, Scotland, and Robert Paterson, of Glasgow, Scotland, for an improved apparatus for making oil gas—the matters had already been protected by English patents—the principal features of which are outlined in the following specification. The inventers say:

Our invention has for its object, by improved, simple, and easily managed apparatus, to make gas of good quality from oil, the same be-

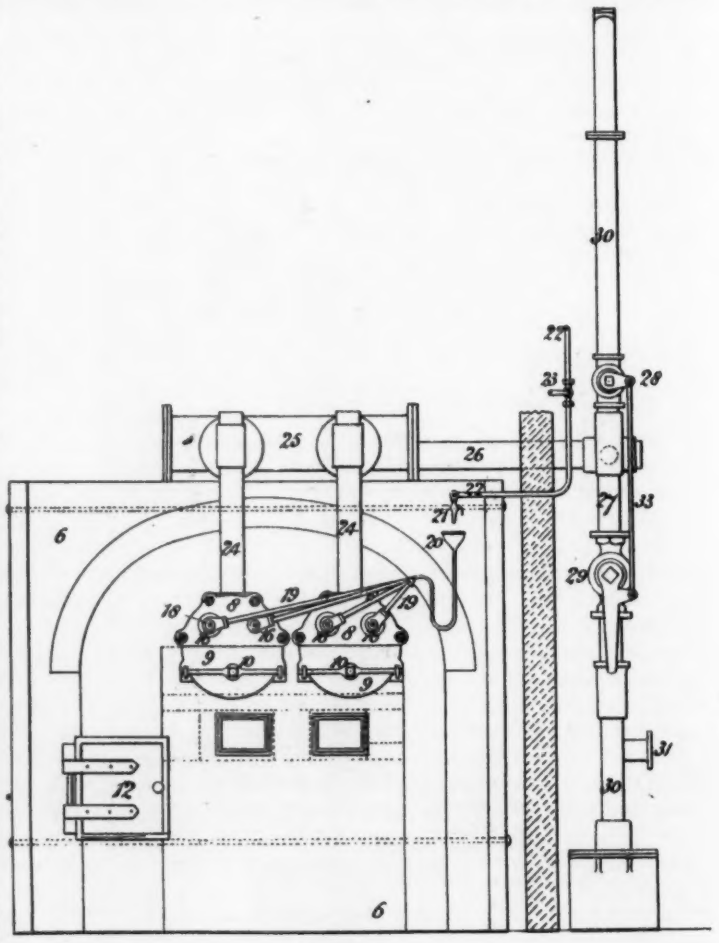


Fig. 1.

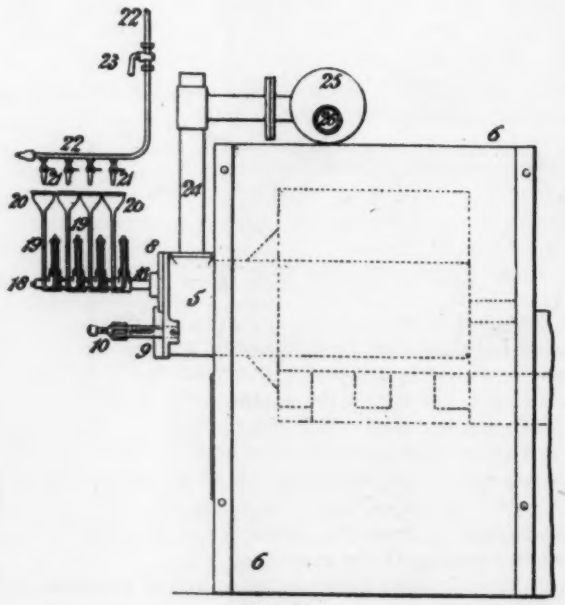


Fig. 2.

ing specially designed for use at country houses or in connection with works or other buildings where gas is made on the premises.

In carrying out our invention we employ one or more horizontal retorts of a cylindrical form arranged in a building with a fire grate and flues suitable for heating the retorts with ordinary fuel. The oil to be

converted into gas, and which is by preference purified petroleum or mineral oil, is led into each retort by two or more straight horizontal pipes placed near the inner surface of the retort, by preference at the upper part, and extending from the front end of the retort nearly to the back end, the inner ends of the pipes being open. The oil is partly converted in passing along the horizontal pipes and issuing from their inner ends. The vapor or gas is further acted on by the heat in passing from the back to the front end of the retort, at which latter part the outlet is situated.

Minor improved details, upon which the practical success of the apparatus largely depends, are hereinafter described.

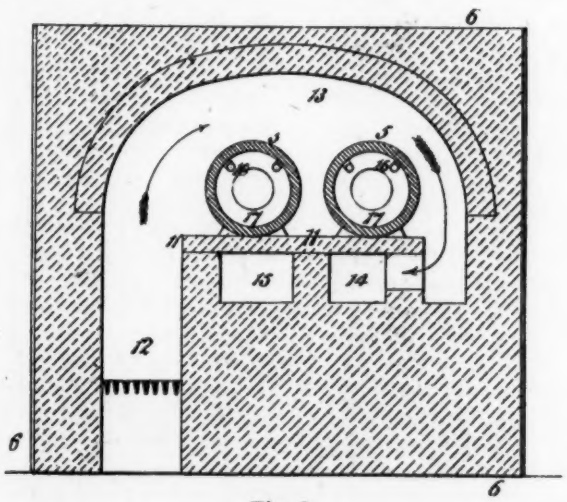


Fig. 3.

In the accompanying drawings, Figs. 1 and 2 are front and side elevations; and Figs. 3 and 4 are vertical sections, as at right angles to each other.

In the apparatus two cylindrical iron retorts 5 are placed in a brick building 6, the back ends of the retorts being formed with studs 7, by which they are supported in the back wall of the building. The front ends of the retorts project through the front wall of the building 6, and each retort is fitted with two end covers 8 9, each upper cover being bolted to the retort in a comparatively permanent manner, while each lower half 9 is held in place by a common bridle and screw 10, so that it can be easily opened for cleaning out the retort. Within the building 6 the retorts 5 rest on a horizontal fireclay slab 11, and the fire-place 12 is made at one side and communicates with an upper oven space 13, in which the retorts are situated. The fire gases pass over the retorts 5 and have free access to their sides, and then pass downward at the side further from the fire-place 12 and enter through ports into a flue 14, extending under one of the retorts. From the front end of the flue 14 the fire gases enter a flue 15 under the other retort and proceed along it to a chimney at the back (but not shown).

Through the top front cover 8 of each retort 5 two pipes 16 are fixed

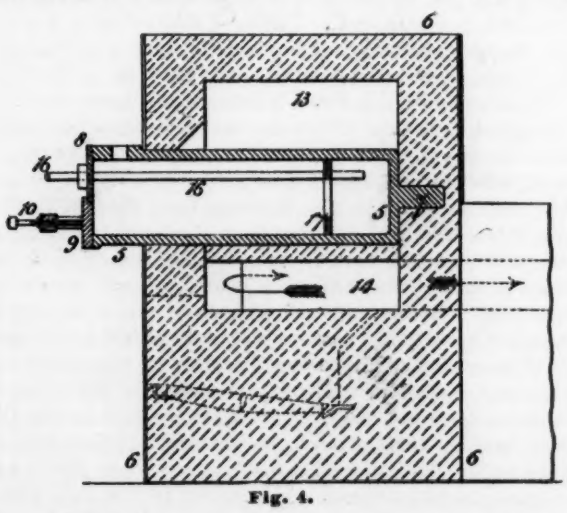


Fig. 4.

so as to extend along inside the retort near its upper internal surface to within a short distance of the inner end of the retort. These pipes 16 have their inner ends open, and are supported near their inner ends by a ring 17, placed inside of the retort, and which ring divides the retort into oil or gas chambers. The pipes 16 are made quite straight to facilitate the cleaning, and each is fitted with a screw-plug 18 at its front end which can be withdrawn to admit a cleaning instrument. The oil is led into each pipe 16 at one side, near its outer end, by a pipe 19, made with a siphon bend and provided with a funnel 20 at its outer end. Each retort pipe 16 is separately supplied with oil, the several funnels 20 being for convenience arranged in a horizontal row beneath separate stop-cocks 21 upon a main supply pipe 22, fitted with a main stop-cock 23, and connected with an oil tank (which is not shown, but which should be placed at a level a little higher than the stop-cocks 21). The total supply of oil can be regulated by the main stop-cock 23, while the portion of the supply allotted to each retort pipe 16 can be separately regulated by the branch stop-cocks 21. The gas formed in the retorts 5 passes off by ascension-pipes 24, connected to their front ends at the tops, into a main 25, and thence by a pipe 26 into a vertical pipe 27, which is provided with two stop-cocks 28 29, one above and the other below the junction of the pipe 26. The upper stop-cock 28, when open, communicates directly with the atmosphere, and the lower one 29 communicates with an ordinary assemblage of pipes 30, known as an air condenser, the set of these pipes 30 being supposed to be seen in edge view in Fig. 1 and to be extending backward. A branch pipe 31 (shown in Fig. 1) is at the back end of the condenser, and is for the attachment of a pipe leading to a gasholder of any convenient kind. The lever handles of the two stop-cocks 28 29 are connected by a rod 33 in such way that the action of opening one closes the other. When freshly starting to make gas the upper stop-cock 28 may be opened to allow the gas or vapor first formed, and which is mixed with air, to escape to the atmosphere instead of mixing with any good gas there may be in the condenser and gasholder. The gasholder drum is counterbalanced by weights made sufficiently heavy to raise it and produce a partial vacuum inside of it for the purpose of drawing the gas from the retorts and through the condenser and piping. This arrangement makes it necessary to provide the two connected stop-cocks 28 29, hereinbefore described, and the closing of the lower one 29 when the upper one 28 is open prevents air from being drawn in by the action of the partial vacuum.

Our improved apparatus, as hereinbefore described, is such as to allow of the action being easily and satisfactorily regulated and controlled, without which good gas cannot be formed economically and the apparatus cannot be kept in good order. With a suitable regular heat in the oven or flue space 13, it is essential for good working that neither more nor less than the proper supply of oil should be maintained. By opening the stop-cock 28 and allowing gas to issue from it its color will afford a means of judging whether the action is going on properly, and the attendant can adjust the supplies of oil or the heat from the furnace accordingly.

The Illinois Coal Industry.

The eighth annual compilation of statistics of the coal industry of Illinois has just been completed by Col. Lord, Secretary of the State Board of Labor Statistics, and is ready for publication. The record for the year ending July 1, 1889, shows the following summaries from the reports of the several mine inspectors as compared with the preceding year:

	1889.	1888.
Number of tons of lump coal mined.....	11,597,963	11,855,188
Aggregate value of product at the mine.....	$12,496,885	$13,309,030
Average value per ton at the mines.....	$1.0775	$1.123
Number of employees of all kinds.....	30,076	29,410
Number of miners..	23,583	23,648
Number of other employees (including boys).	6,943	5,762
Number of boys employed underground.....	859	868
Average price paid per ton for hand mining..	$0.731	$0.716
Number of men killed	42	55

The total fuel product, including what goes through as well as over the screens, for 1888 was 13,396,362 tons; and for 1889, 13,105,698 tons. There is a shortage of 694,452 tons in the northern half of the State, and an excess of 437,227 tons in the southern half over any previous year. Macoupin is the banner county, raising 1,202,187 tons. The average value of coal at the mines in the State has gradually declined from $1.51 in 1882 to $1.07 in 1889. This, however, gives little idea of the wide variation in values in different localities and under differing conditions. The extreme of prices reported is from 50 cents to $2.25 per ton. Fifty cents per ton on the track is given as the average value of coal at several places in St. Clair county, and in one instance 60,000 tons are reported at this price. This is, however, altogether exceptional, and is the lowest price ever given the inspectors. Above this, prices range in the same vicinity from 62½ cents to $1 per ton, giving an average for the

fifth district of 87 7/10 cents. In the second district, on the other hand, in the northwestern portion of the coal fields, prices range from $1.25 to $2.25 per ton at the pit, with an average of $1.43. These extremes in prices are by no means arbitrary, but doubtless fairly indicate the actual difference in the cost of production; for competition is sufficiently active everywhere to keep prices close down to the cost of the coal.

In view of the mildness of the winter and the depression in trade occasioned by it, and more especially in view of the general suspension of operations in the northern field pending a settlement of the wages question during the last two months of the year, the falling off in the annual output is perhaps less than might have been expected. The number of mines and of men is slightly increased over all former years; the average value of the product has dropped from $1.12½ to $1.07¾ per ton; the average number of days of active operations has fallen from 220 to 211; the price of hand-mining for the State at large is found to have slightly increased, and the number of fatal accidents has materially diminished. There has been rather more than the usual number of new mines opened, but a corresponding increase in the number closed, while the number of mining machines reported as in use is less by 37 than the number in use the year before.

The four mines from which have been delivered the greatest tonnage during the year and the only ones which have produced over 200,000 tons are the Chicago, Wilmington and Vermillion Coal Company, No. 1, at Streator, La Salle County; Consolidated Coal Company of St. Louis, No. 6, at Staunton, Macoupin County; Consolidated Coal Company, of St. Louis, No. 1, at Mount Olive, Macoupin County, and Pana Coal and Mining Company, Colliery No. 1, at Pana, Christian County—the total tons produced being 922,484. The average daily wages paid machine men indicate ruling rates of $2.25 and $2.50 per day for machine operators, $1.75 for helpers, $2 for blasters, $1.75 for loaders, $2 for timber men, $1.50 and $1.75 for laborers and $2 for drillers. The average prices paid for mining by hand decreased from 80 cents per ton in 1883 to 73 cents in 1889, though in 1886 the average was as low as 67½ cents. These are general averages by districts. The extremes show the lowest to be 31½ cents and the highest $1.50. The price paid for the greater portion of hand-mining is from 50 cents to 95 cents a ton, the latter in the thin web coal of Will and Grundy counties and the former in the high and dry seams of the southern fields.

This year the machine-mined coal is 21 per cent. of the entire product; last year it was 19 per cent. The increase in the output of this character is largely in the fourth district, and the decline in the first and fifth. Several new machines have been produced during the year and several experiments have been made in the use of electricity in the place of compressed air. The mine at Girard, in Macoupin County, has an electric plant on trial which is furnishing motive power to a new device for under-cutting the coal and at the same time furnishing a current for a system of electric light throughout the workings. With the gradual development of the coal resources of the State it is found that the number of operatives drawn there by the demands of this industry increases year by year, regardless of the fluctuations in trade in wages. This receives fresh illustration in the totals reported for this year, which has not been altogether a prosperous one, and yet the number of employees now in the State is reported as 30,076, or 666 more than in any previous year.

After rehearsing the history and results of the great wage controversy in Northern Illinois the report says: "Thus ended a strike which involved more men, more loss of time, more loss of good wages and of product, occasioned more distress, commanded more public sympathy and discussion, more public declarations of the points at issue by both parties, and at the same time was conducted with more patience and moderation on the part of the men in view of their number and distress, than any which has occurred in the history of coal mining in this State."

Methods of Lighting Work on the New Croton Aqueduct.

The *Engineering Record*, in the course of a series of articles on "Builders' and Contractors' Engineering and Plant," alludes in the following manner to the methods of lighting followed by the contractors in charge of the work on the new Croton Aqueduct:

The methods employed for lighting the tunnel of the new Croton Aqueduct during its construction were chosen by the different contractors to suit their own ideas as to system, except on that portion of the work where the orders to use improved methods were complied with.

On the Northern Division, where the work was executed by Brown, Howard & Company, kerosene lamps and gasoline torches were generally used, Each torch being provided with 15 burners, consumed a large amount of oxygen, nearly as much as 15 men would require, and the smoke from the torches and lamps sometimes became so dense in the headings as to cause a stoppage of the work. When more torches were added to increase the light the increased amount of oxygen consumed and smoke evolved produced an opposite effect, making the lights so dim that the darkness was almost visible; while the lamp-black emitted by these lamps filled the lungs of all exposed to its influence.

The stationary lamps were constructed of tin, with a flat reservoir to hold the burning fluid, from which a small pipe extended down about 2 feet, and then projected horizontally about 10 inches, terminating in the burner. Hat lamps were used by the miners, in which miners' oil was burned with kerosene added to increase the flame. Candles were also occasionally used for hat lights.

These lights were also used by John Brunton & Company at the beginning of the work below Harlem River, but they were generally replaced by electric lights in December, 1886. As the headings on this portion of the work were advanced only a few hundred feet at that time the bad effect of the oil lamps was less noticeable.

Electricity was introduced on the Northern Division in 1886, but the lamps placed in the tunnel were very far apart. In the tunnel leading from shaft 2 the intervals between the lamps varied from 500 to 600 feet. At shaft 11 there were three lamps in 2,000 feet. In November and December, 1886, the official report showed that 7 electric lights were burning in the headings of shaft 2, and the same at shaft 3. At shaft 5, on December 21, 3 lamps were reported to be in use by the bricklayers, and 8 along the tunnel: but this is the only case where so many lamps were used. Two lamps were reported at shaft 6, and 4 at shaft 9. The full number of electric lamps given above was not burning all the time, but only at intervals, particularly in the tunnel. Frequent reports were made of from 5 to 7 gasoline torches being used by the bricklayers in one heading.

On the Southern Division, which was built by O'Brien & Clark, electric lights were the rule, and, consequently, the condition of the atmosphere was very much better. The lights were not frequent enough in the tunnel to permit one to travel about freely without the aid of lamps, but all points where work was in progress were well lighted by electricity. On a portion of the work 4 lamps were burning within 1,000 feet; but in other places they were 500 feet apart. The miners and muckers were provided with the usual hat lamps, but in some of the headings candles were used altogether for hat lights, especially at shafts 16 and 17.

An electric light plant was placed at nearly every shaft. A complete electric lighting plant would have required a steam boiler, an engine, a dynamo, and necessary lamps, but as boilers were provided for operating the compressors and hoisting engines at each shaft, the surplus power was generally sufficient for operating the dynamos. At many of the shafts the dynamos were placed in a room separated from the rest of the plant to guard against accidents.

The best location for the wires in the tunnel was up out of the way near the roof, and secured to the rock or the arch of the completed conduit. On a portion of the work the wires were placed only a few feet above the floor, where they were liable to cause accidents whenever the insulation became imperfect. The lamps were suspended from the center of roof, or at one side, as was most convenient.

The engines used for operating the dynamos were small, usually from 15 to 20-horse power, and the dynamos were adapted for divided arc lamps. To operate a full-sized arc lamp of 2,000-candle power requires about 1-horse power. The lamps used were of 1,200-candle power, which did not require more than ¾ of a horse power each. Only one plant supplied more than 15 lights, so that a 15-horse power engine gave ample power except where there was more than one dynamo at a shaft. At Shaft 30 there was a large dynamo with capacity for 30 lamps, which supplied the current for lighting 6 shafts, from Shaft 27 to 32, inclusive. The conditions here were different from those on any other portion of the line, and unusually favorable for lighting several shafts with a single plant, as these shafts were either located in Tenth avenue or adjacent to it, permitting the telegraph poles on the avenue to be used for carrying the wires between the shafts, which were only ½ a mile apart or less.

The dynamos and conductors used on the Aqueduct were in use continuously day and night, and were subjected to pretty rough treatment, the wires being carried in wet shafts and tunnels, in process of construction, and having, with the lamps, to be shifted daily to permit blasting.

Lightning arresters, to protect the dynamos, were placed on the main current wire, outside of the stations, except in the Ball system, where the wet poles were expected to supply all the conduction needed.

The lamps used for arc lighting on the Aqueduct differed slightly from the ordinary lamps for street service, but the change was only that necessary to adapt them for rough usage.

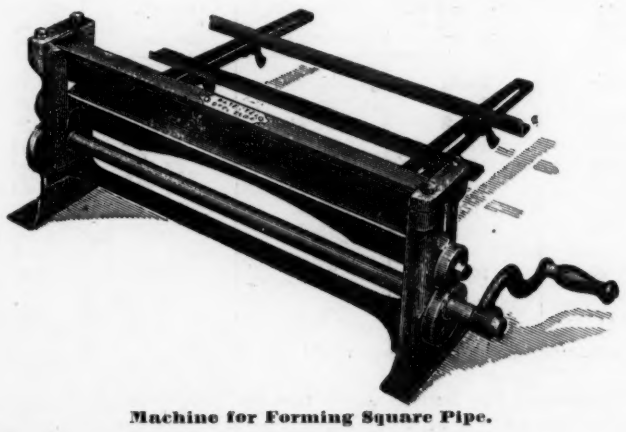
The dynamos and lamps used for supplying light in the Aqueduct

shafts and tunnels were furnished by the following parties: the Bell Electric Light Company, New York City; the Thomson-Houston Electric Company, Boston, Mass.; the Schuyler Electric Company, Middletown, Conn.; the United States Electric Lighting Company, New York City, and the Brush Electric Company, New York City and Cleveland, Ohio.

Power for running the dynamos was supplied by engines of the following makes—viz.: Westinghouse, Payne, Lidgerwood, Greenfield, Sullivan & Ehlers, and the New York Safety Steam Power Company.

Former for Square Pipe.

The Pittsburgh Sheet Metal Tool Company, Limited, of Allegheny, Pa., is introducing to the trade a machine for forming square heater pipe, cans, boxes, etc., a general view of which is shown in the accompanying illustration. The manufacturers state that this is one of the best for the purpose which has ever been offered the trade, and that it will form a perfect angle up to 90° with one motion of the hand. It is designed for executing any description of square work. It is claimed to be speedy, accurate, and economical in operation. The arrangement of the gauges is such as to make it unnecessary to lay off the sheets to be formed, and that when once set long and short sides can be alternately made as readily and speedily as if but one gauge was employed. A



Machine for Forming Square Pipe.

careful inspection of the accompanying illustration will convey a very good idea of the general arrangement of parts, making a detailed description unnecessary in this connection. The machine weighs about 45 pounds, and may be employed on any bench without the necessity of fastening it down. It is said to be in use in a number of large manufacturing establishments in Pittsburgh and other cities, and those who have employed it speak in high terms of its operation.

The Lighting of an Imperial Railway Train.

M. Warchowsky, Engineer and General Inspector of the Russian railways, gives a description of the somewhat extensive electric lighting of the Imperial train which was adopted after preliminary experiments with a part of the train only. The firm of Jablochkoff & Co., of St. Petersburgh, constructed and fitted the incandescent lamps, which are of 6 to 8-candle power at 30 volts, the conductors arranged with contacts between the carriages, the accumulators disposed in three groups, the apparatus for charging these accumulators, the voltmeters and ammeters, and also the dynamo. The steam engine for driving the dynamo is a Brotherhood 3-cylinder machine. The boiler, horizontal, with iron fire box and tubes, was made by Messrs. Nobel, St. Petersburg. The dynamo, steam engine, boiler, the battery of 36 accumulators, and the reservoir of water are fitted in the middle compartment of a wagon with four partitions specially constructed for the purpose. The other compartments containing the fittings and oil, the fire pumps, the Graftio apparatus for controlling the speed of the train, and, lastly, a Schwarzkopf apparatus for prevention of explosion of the boiler. The Imperial train consists in all of 15 carriages. The total number of lamps employed is 253, and they are disposed as follows: Electric wagon, 6; workshop wagon, 8; the Minister of Internal Communications, 22; the Czar's servants, 15; kitchen wagon, 13; buffet wagon, 13; dining-room car 26; Czarina's car, 18; Imperial car, 36; Grand Duke, 20; ladies-in-waiting, 21; body guard, 13; luggage, 7. All the incandescent lamps can be turned on or off separately by the aid of two cords, one red, the other black. Another battery of 18 accumulators is placed in the buffet wagon, enclosed in a wood box; a third battery of the same number of cells is placed in the dining-room car. The accumulators are charged by the main current from the dynamo. The engine is capable of working at 15-horse power, but works usually at about 12-horse power. In the carriages the lamps are distributed singly and in groups. The lamps are either obscured or fitted with ground glass shades, and in the Imperial car movable fittings are used.

When the whole of the train was completely fitted, the authorities made two thorough tests. First, the train when standing was lighted for 24 hours; secondly, the train was completely lighted during the journey from St. Petersburg to Moscow (400 miles), at an average speed of 35 miles an hour, at Moscow during a stoppage of 10 hours, and throughout the return journey to St. Petersburg. During the last test the dynamo was stopped for about two hours, and the accumulators completely charged were then used alone. The Imperial train during the journeyings of the Czar in 1888 ran a distance of more than 5,000 miles, and the electric light always worked well. The train was partially wrecked during the catastrophe of October, 1888, but the wagon on which was this rolling electric central station, which followed next to the tender of the second locomotive, was practically uninjured.

Electric Lighting of Ships.

Engineering says the past year has been notable for the large proportion of vessels fitted with the electric light, and also for the progress made in the economical and effieient production of that light. The speed of dynamos has formed one of the most important subjects of study by the electrician, and while in the case of almost all other engines greater speed is the desideratum, here the reduction of the number of revolutions is the aim sought after, for thereby is the life of the machine lengthened. We are now within a short distance of attaining 200 revolutions. The arc lamp, because of the great care it requires—and which is seldom given on shipboard—is being superseded by sunbeam and groups of high candle power lamps, which are adopted specially for cargo working. The relative advantages of single and double wires in ships is a bone of contention amongst electrical engineers; but the tendency is regarded as towards the single wire system, where with due care on the part of the engineer there is no likelihood of the compass being affected. Dynamos for incandescent lighting are of such low pressures as to insure complete safety of life. Danger alone lies in improper qualities of materials and indifferent workmanship. Steamers of all types now adopt the electric light, and this year the number of cargo vessels fitted with an installation has been most marked. It is used for all purposes, and in one particular respect in which the development is most noteworthy; it is the fitting of cargo boats with long cables which may be run from the ship over the wharves to light them up when cargo is being moved. It is too late in the day to speak of the general advantages of the electric light over the paraffine lamp.

The Conversion of Gas Globes into Regenerative Lamps.

[A paper read by Mr. D. R. Gardner, before the Glasgow (Scotland) Philosophical Society.]

The author began by stating that he was led up to the invention he was about to describe by his experience in connection with the consumption of smoke in boiler furnaces. Many years ago, after having been summoned for creating an alleged nuisance by smoke, he investigated the principle of consuming, or rather of preventing smoke; and he found that highly heated air, properly applied in the furnace, was all that was necessary. He afterwards proceeded to bring this principle to bear in the production of a regenerative gas lamp suitable for shops, halls, etc. He studiously avoided the method in which other inventors had carried out the principle of regeneration in gas lamps, and was led to supply the air from the bottom of the shade alone, and to control the draught by means of a damper at the top of the funnel, which, by being screwed up or down, adapted the lamp for burning gas of any quality or at any pressure. In like manner he carried out the same principle in ordinary gas globes or shades.

With the view of explaining the science of increasing light for illuminating gas, the author quoted from an article in "Ure's Dictionary of Manufactures and Mines," to show that the proper burning of illuminating gas depended upon certain physical and chemical conditions, the due observance of which was of great importance in the development of a maximum amount of light. Chief of these was the prevention of the escape of any particles of carbon unconsumed. He also referred

to Dr. Frankland's Argand burner, fitted with a double chimney for the purpose of highly heating the air; the result being that when 3.3 cubic feet of gas were consumed per hour with the single chimney, 13-candle power was yielded by the gas, whereas by employing the double chimney 21.7-candle power was developed. The double chimney was tried by the author before he was aware of its previous use; but he found it to be valueless, as the double glass considerably obstructed the light, and the dirt and moisture carried in by the current of air further obscured it. He then resorted to the ordinary globe, and discovered that by materially diminishing the outlet the flame materially increased in size. His thoughts were at once directed towards the materials and form best suited for a cover to the shade. Asbestos was tried, by moulding or fitting it on the globe; but when a high temperature was maintained the globes would occasionally crack. Latterly, after making various attempts to overcome this and other difficulties, the author hit upon the expedient of using small plates of mica between the asbestos and the glass shade as non-conductors of heat. Although he had subjected the shades to very severe tests, he had not since broken one. The cover might now be considered to be as simple and perfect as it was possible to make it, as it suited all qualities of gas, the different pressures, the various sizes of burners, and could be used with the present shades and gas fittings by merely placing it on the shade and adjusting the regulator. The appliance has been patented in the United Kingdom, and will be in other countries.

The following is a brief description of the cover in the form now arrived at by the inventor: Sheet asbestos, specially prepared for the purpose, is cut into discs varying from 4 up to 7¼ inches in diameter, and rising ¼ inch to each size, so as to suit all the different sizes of shades. In order to hold the cover in its place three asbestos studs are fixed on its lower surface, moving in an eccentric, which allows the cover to be most perfectly fitted. Round the lower edge there are half-a-dozen discs of mica fixed. These act as non-conductors between the glass shade and the cover. In the center of the cover there is punched out an opening 1¼ inches in diameter, and the disc so removed is fixed by means of a stud to the cover at one side of the opening on which it turns—thus becoming a valve to regulate the size of the aperture according to the quality and quantity of gas used.

Mr. Gardner stated that he had recently called upon Mr. W. Foulis, the General Manager of the Glasgow Corporation Gas Department, to confer with him on the invention. This gentleman at once heartily took up the matter, and volunteered to have it subjected to a thorough scientific testing photometrically by Mr. D. Terrace at the Dawsholm Gas Works. The author then briefly referred to some of the papers on "The Economical Use of Gas," by Mr. Terrace and the late Dr. Wallace, and went on to state that the former gentleman, in showing that the improvement under consideration was not to be had from burners, said that in testing several of the devices intended to improve the ordinary open gas flame, he found no increase in luminosity per cubic foot of gas consumed from that given by the Union-jet burner consuming 5 cubic feet per hour, at 0.5 inch pressure. At this stage Mr. Gardner directed the attention of the members to a table in which were embodied the results of a series of tests made by Mr. Terrace, with the view to ascertain the loss of light with small burners and high pressure; also to a table showing the loss of light resulting from using different kinds of shades. He stated that if the extremes of the two tables were taken together the loss of light was something like 91 per cent.

In summing up, the author said he found from the different authorities that highly heated air produces complete combustion, and gives an increased luminosity to the carbon contained in the gas, and that it is necessary to retard the flow of gas at the burner. The question came to be: "Had those two points been attained by the application of the asbestos cover?" One experiment, he remarked, would be sufficient to demonstrate this. He caused a cloud of smoke from a piece of brown paper to enter the shade, which showed a quiet condition of the atmosphere around the flame, and consequently a retardation of the flow of gas at the burner, while the temperature of the surrounding air was raised to the point desiderated by Dr. Frankland for the combustion of the light carbureted hydrogen that passes off unconsumed from an ordinary gas flame. Mr. Gardner declared that he had burned a number of lights with the covers on in a small room for a couple of hours, and on returning to the room from the fresh air, he could not perceive the slightest unpleasantness in the atmosphere; whereas if the shades had been without covers the air of the room would have been both disagreeable and unhealthy.

The illuminating power attained by Glasgow gas by the use of the Gardner asbestos cover had been tested by Mr. Terrace, under the direction of Mr. Foulis, and the results were shown in a table exhibited, of which the following is a copy:

Description of Globes (Clear).	Tests with Union Jet Burners at 5-10ths Pressure.		Illuminating Power Corrected to Five Cubic Feet.			Increase per Cent. with Cover.	
	No.	Consumption per Hour. Cubic Feet.	Open Flame. Candles.	Globes without Cover. Candles.	Globes with Cover. Candles.	Open Flame as Standard. Per Cent.	Globes without Cover as Standard. Per Cent.
Comet	8	5.00	22.19	20.91	24.49	10.36	17.12
Squat	8	5.00	.....	19.40	24.50	10.41	26.29
Nelson	8	5.00	22.25	20.25	24.61	10.60	21.53
Queen Anne	6	3.75	20.15	17.10	22.41	11.21	31.05
" "	4	2.75	15.49	13.25	18.83	21.56	42.11
Squat, small } 15-10ths	4	5.08	11.41	10.27	14.75	29.27	43.62
" large } 15-10ths	4	.....	11.41	9.89	13.66	19.72	38.12
Nelson (ground, with flowers) 5-10ths	8	5.00	22.35	14.35	19.68	.....	37.14
Queen Anne (clear, with fern) at an angle of 45°, at 5-10ths	8	5.00	18.88	16.81	29.03	53.76	72.70
Queen Anne (clear) at an angle of 45°, at 5-10ths	4	2.75	.....	9.59	21.15	.....	120.50

Proceeding, the author stated that the tests were taken horizontally and in the most favorable conditions for the open flame, viz., with a No. 8 burner consuming 5 cubic feet of gas per hour at 0.5-inch pressure. Comparing the covered globe with the open flame, an increase of light was obtained of from 10.36 to 21.56 per cent. Then, comparing the covered with the uncovered shades, a greater difference was arrived at, viz., 17.12 to 41.11 per cent. Blackened covers were tried in order to see if the increased luminosity was due to reflection; but they also showed the same good results. Tests were made at an angle of 45°, which is about the usual position of a light in relation to the person using it, and they gave, with a covered shade and a No. 8 burner, 53.76 per cent. more light than the open flame; whereas on comparing the light from the covered shade with that from the uncovered shade, 72.70 per cent. more light was obtained. With a No. 4 burner the increase of light, by using a covered shade, rose to as much as 120.5 per cent.

In conclusion, Mr. Gardner said that looking at the immense daily waste of gas (amounting, according to the late Dr. Wallace, to £130,000 per annum for Glasgow alone, fifteen years ago), he thought it would be well for the Glasgow Corporation Gas Trust to lead the way in promoting its economical consumption by instituting a Lighting Department that would superintend the burning of the gas, and not allow the consumers to waste so large a percentage of it.

There was very little time allowable for the discussion of the subject raised by Mr. Gardner's paper; but, as Mr. Foulis was present, he was called upon by the Chairman to make a few remarks. This gentleman said he had been much interested in the invention, the results of the testing of which had greatly surprised him. The gas authorities of the city and himself were always ready to encourage every feasible attempt to improve the illuminating effect of the gas supplied to the consumers, and in this spirit he had authorized Mr. Terrace and his assistant (Mr. Duncan) to test Mr. Gardner's invention most thoroughly. The results were seen both in the table exhibited and in the lamps with which Mr. Gardner had been experimenting that evening. He (Mr. Foulis) was not, however, yet prepared to admit that the whole of the effect, if even any appreciable amount of it, was obtained by the increased heat of the air used in the combustion of the gas. He rather thought it was almost wholly due to the quietness of the atmosphere within the shade. Having alluded to the experimental investigations which Mr. John Methven

had lately been conducting in a somewhat similar direction, but with Argand burners and the use of chimneys necessary for them, he remarked that he had been deeply interested in Mr. Gardner's paper and the experiments, and felt that the Society was much indebted to him for having brought the subject before them.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE following plain, common-sense letter is well worth reading:

POUGHKEEPSIE GAS LT. COMPANY,
POUGHKEEPSIE, N. Y., Jan. 13, 1890.

To the Editor AMERICAN GAS LIGHT JOURNAL:—I wish to thank you in behalf of our Company for the stand you have taken in regard to the general adoption by gas companies of the business of supplying electric currents. We have, I suppose, the very best facilities, from the peculiarities of our present position, for engaging in the production of what has been called the light of the future. We have a gas plant lying idle in the center of the city, with the privilege of paying a good round tax yearly on the same. We are often told by the venders of patented electric light apparatus that we are the only ones who could supply at a profit in Poughkeepsie this light of the future. Estimates have been received by us, and we have also figured on the prices received by the electric company doing business in our city, and the result is that we prefer to pay taxes on idle plant; for experience has taught us that if we put half the capital and energy into our present business that would have to be employed did we determine to engage in electric lighting, our stockholders would be quite satisfied over the net result. Let me here state what we have been taught by our competitor in the business of supplying light. First, we find that, as a rule, where they succeed in securing a contract to light up a building the gas burners in that building were in bad condition. They make an impression on the mind of the user at once—he had poor gas burners and an inferior light; the change to new incandescent lamps undoubtedly gives him a more satisfactory illumination. Naturally, his next door neighbor is called in, and the advertisement is secured. In fact, our electricians employ a man whose duty it is to ferret out places in which inferior gas burners are employed. In olden days, I must confess, we never thought of such a thing as looking after the state and condition of gas burners; we let the consumer study the matter out for himself. But electricity and its advocates have taught us a good lesson, and brought us to the practice of doing that which in justice to our business was essential, provided we desired to give it that standing rightfully its own from inherent merit. We employ a man now to attend to all complaints, who is further instructed with the task of placing new burners where such are needed. The plan gives good satisfaction, for the burners are adjusted free of charge to the customers. We find this to be one of the best investments that we have ever made. The burner (made by the Jackson Burner Company, of your city) that we favor most is not expensive—it is an all steel burner and does not corrode. Of course, the Jackson article is for ordinary consumption in stores and dwellings; for outdoor lights we use the Gordon lamp. We also use, in direct competition with the incandescent light, the albo-carbon, which, in my opiniou, furnishes the cheapest illumination when the apparatus is properly cared for. But, Mr. Editor, permit me to impress on your mind that our field for gas supply is larger than that for illuminating purposes pure and simple; and it is bound to widen when it can be shown that cooking by gas can be accomplished (at certain fairly remunerative figures) 25 per cent. cheaper than when dependence is placed upon the ordinary coal range. When you can afford to sell gas for such use at $1 per 1,000 in the summer months, and all the time, why can you not keep your works going all the time at their full capacity? We started last May in the cooking business, and made the start with but little faith in our ultimate success as to the new enterprise; but one season's struggle has demonstrated to our entire satisfaction that this year will be the twelvemonth of our greatest output, for the demand is greater than we ever expected it would be. We, however, did not secure this result and that trade by simply putting the cooking, heating and power rate at $1 per 1,000. We had to experiment on the different kinds of stoves that were offered on the market, and when we found the specimen best adapted for our gas we not only placed them ourselves, but instructed the consumer how to use them to the best advantage, and after a half dozen had been placed we found no trouble in securing additional customers. What I would say, in conclusion, to my fellow gas men is this: If you have an opposition electric lighting company in your city all that you need do to hold your position is to *put as much* energy and capital into your gas business as they do into theirs. If, then, you do not earn double what they do on the investment, all I have to say is that your gas plant is not up to standard. Yours, JOHN TRACY.

A LINE or two from Mr. James Ferrier, Superintendent of the Eufaula (Ala.) Gas, Electric Light and Power Company, says that both divisions of the Company's business are going along smoothly and satisfactorily. We imagine, however, that the last fall season must have been an anxious one with him, and a busy one withal. We incline to this view from the fact that between September 7th and October 29th a new bench of 3's was added to the gas plant, while the same period beheld the placing, complete, of a 50-light arc installation. Within two weeks from the arrival of the machinery the electric lamps were in service.

MR. J. FRED SEAMON, formerly Inspector of the City Gas Works, Wheeling, West Va,, has been appointed Superintendent of the works of the Cumberland (Md.) Gas Light Company. The new appointee takes the place of Mr. C. A. Seay, who has acted as Superintendent of the Cumberland Company since 1854.

MR. JNO. CABOT, of this city, has returned from his protracted visit to Europe. He looks hale and hearty, and had a splendid time, but hereafter his P. O. address will be at the old station, 306 to 310 Eleventh avenue, N. Y. City.

MR. ADAM WEBER informs us that he has been awarded the following contracts:

24 benches of 6's for 14th st. station Consolidated Gas Light Co.
26 " " 42nd st. " " " " "
20 " " Equitable Gas Company, N. York City.

These benches are to be fired with the new and improved Weber recuperative furnace.

SOME days ago the Union Depot, Birmingham, Ala., was thrown into confusion because of an incipient conflagration that occurred thus wise: In the dining-room of the depot both gas and electricity are used for lighting, and the electric wires are trailed along the service pipes of the chandeliers. A defective bit of insulation permitted contact of the current wire and the gas pipe, whereupon the latter was burned through, permitting the gas to escape. On the ignition of the gas the wooden ceiling took fire. The flames, however, were extinguished before they had gained any headway.

THE bids recently opened by City Works Commissioner for the public lighting of Brooklyn, N. Y., for the ensuing year, show no change over those submitted in 1889 save in respect to the rate asked by the Brooklyn Gas Light Company. The proposals are as follows:

Bidder.	Rate per Light.
Citizens Electric Light Company.....	$182.50
Municipal " " "	182.50
Brooklyn Gas Light Company.....	22.00*
Peoples " " "	22.00
Nassau " " "	22.00
Citizens " " "	22,00
Williamsburgh " "	21.75

The electric lighting specifications call tor 1,200-candle power arcs (they have been "calling" for that illuminating value for some time back, but it is notorious that their real power does not exceed 400 candles) and 4,000 hours of burning. The gas lamps are equipped with 3-feet burners, and are lighted on an average of 4,000 hours per annum. The bid prices include lighting and extinguishing charges.

THE Brooklyn companies also agreed to supply gas to the public buildings at the uniform rate of $1.60 per 1,000—which, by-the-way, is the maximum rate that may be charged for gas within the city limits.

WE understand that the Suburban Light and Power Company has been notified by the Mayor that its offer for lighting Boston has been accepted. The terms of the contract for the city proper, South Boston, Dorchester and West Roxbury are 39.74 cents per arc per night, the rate for the Roxbury district to be 39.99 cents. There are about 900 lamps in the allotment, and it is estimated that under the agreement Boston will save something like $72,000 over the total sum paid out on like account last year. The new Company—it is at present without sufficient plant facilities to carry out the work—has pledged itself to be ready to light

*Last year, $19.80.

both Roxburys and Dorchester within six weeks, South Boston within 12 weeks and Boston proper within 16 weeks. In the meantime, the Boston Electric Light Company (which performed the lighting for 1887) will keep on the service until the successful bidders are ready to take up the task.

No doubt the Boston authorities are satisfied that the Suburban Light and Power Company is solvent and amply able to perform all its promises; but in view of the very low figures that it has seen fit to accept (and presuming that the requirements as to candle power and service are to be looked after critically by the Superintendent of lamps), we nevertheless are under the impression that many a strain will be made during the life of the contract, on even what is known as the French style of measurement, by the Company. Lamps of the illuminating value required by the specifications cannot be supplied at a profit in Boston at the accepted contract figures.

THE proprietors of the Troy (N. Y.) Gas Company have placed on Second street, between Broadway and Congress street, ten Gordon lamps, with a view to making a determination whether such lamps can be depended upon with certainty for public lighting. The New York samples, it might be added, are answering every requirement.

MR. JNO. MACKEOT, Supt. of the West End Gas Works (Main street, Pittsburgh, Pa.), was the victim of a painful accident some days ago. While overlooking repairs to an oil tank, an explosion occurred that scattered the burning oil over the Superintendent's face and neck.

ABOUT a fortnight ago the City Council of Monterey, Mexico, granted a franchise for the operation of a gas and water works at that point to Messrs. B. F. Larue, G. S. Butcher and Blas D. Guiterrez. The concession is a good one, and the gentlemen named are perfectly solvent. This place is the capital of Nuevo Leon, Mexico, is on the river San Catalina at a point about 175 miles south of Laredo, Tex., and is in the heart of a very fertile valley. Population about 28,000.

THE proprietors of the St. Croix (Me.) Gas Company are inclined to add an incandescent plant to their present arc installation.

SUPT. DOUGLAS, of the Mutual Gas Light Company, Savannah, Ga., is busily engaged in making important extensions to the Company's distributing system. About two miles of 4-inch pipe will be placed, and we have an idea that it will prove to be about as good an investment as the Company ever made.

A CORRESPONDENT informs us that the General Statutes of the State of Ohio contain the following provision: "The Council of any corporation in which gas works may be constructed, may provide by ordinance for the appointment of an inspector of gas, whose duty it shall be to inspect all gas and gas meters, and certify the correctness of all bills against consumers, make photometric tests, and perform such other duties as may be prescribed."

SENATOR BUTLER has offered a resolution in the Senate directing the Committee on the District of Columbia to inquire into the expediency of the purchase by the government, by condemnation or otherwise, of the works of the Washington Gas Light Company, and to inquire what would be a reasonable profit on the capital stock of said Company, and what dividends have been paid in the past 10 years on the stock. The Committee is directed to report their investigations to the Senate. Have we not been treated already to a nauseating plethora of farcical investigations into the gas supply of Washington that originated in the "Upper House?"

THE authorities of Philadelphia are figuring on what the probable cost of introducing the eight hour labor system in the city would amount to Their investigations so far point to the fact that in the Bureau of Gas the extra amount of cash required per annum would be $255,360.

THE electric plant of the Rockville (Conn.) Gas Company has been completed. It is said to be quite satisfactory to the proprietors.

THE Chairman of the Finance Committee of Cincinnati Councils has reported an ordinance under which it is proposed to create the position of Electrical Engineer, the appointment to be made by the Mayor, subject to approval by the Council. The term of office is to be for two years, the salary $2,500 per annum, and the bond to be $5,000. Further, that the sum of $1,000 shall be appropriated annually to the Cincinnati University for the use of scientific apparatus for testing electric apparatus for light and power, and "artificial illuminaton of every kind."

THE City Council, of Columbus, Ga., having determined that the city was not being properly lighted under the arc contract now in force, has decreed that hereafter, within certain defined limits, there shall be only 600 feet between arcs.

ABOUT a fortnight ago Mayor Davidson, of Baltimore, forwarded to Capt. Hall, President of the Consolidated Gas Company, the following letter: "So much has been said and written in regard to what may be called the Armstrong proposition, and some of its features are so interesting that it is well worth considering. That the supply of gas is in the nature of a natural monopoly, and that the time has arrived when cities must derive some portion of the revenue to meet their necessarily enormous and increasing expenses from such monopolies may be conceded. The question then presents itself as to the certainty and amount of the city's revenue according to the proposition offered. If Mr. Armstrong's figures and estimates could be guaranteed the proposal would be very inviting, but as they are merely conjectured, I would suggest something more definite and certain. For instance, let the Gas Company (1) waive its claim to any exemption of its plant from taxation; (2) to agree to supply the city with gas at, say, $1 per 1,000; (3) pay the city as a bonus, say, $10,000 during 1890, and increase the same $10,000 during each year for 25 years, such bonus to be considered as part of the expenses of the Company in ascertaining the profits to be paid to the city; (4) the city to reserve the right to abrogate the agreement at the expiration of any period of 5 years, upon giving, say, one year's notice to that effect. In this shape the city would derive immediate advantage from the arrangement though small in proportion to the enhancement in value of the Company's stock immediately upon the adoption of the measure, and at the same time the gas consumer will pay no higher rate than he will probably be compelled to pay for some years without such a measure." Mayor Davidson's cool assurance, say, for solidity, is little short of remarkable; and so it also seemed to strike the gentleman who was favored with the communication. On the day following the reception of the letter Capt. Hall sent the following reply: "We are in receipt of your letter. It has been read to the committee, and it is their unanimous opinion that the proposition is so onerous that it is impossible to accede to it under any circumstances."

THE following is the result of the recent election held by the Laclede Gas Light Company, shortly after the purchase by the latter of the old St. Louis Gas Light Company's franchises and property: President, Emerson McMillin; Vice-President and Purchasing Agent, J. D. Thompson; Treasurer and Paymaster, George M. Paschall; Secretary and General Bookkeeper, Alex. Ross; Engineer, Frederic Egner; Supt. Station "A," John B. Taylor; Supt. Station "B," Geo. C. Brown; Supt. Stations "C" and "D," Geo. T. Thompson—and a decidedly efficient staff it seems to us to be. It is the intention of the management to expend about $500,000 in remodeling the works of the old St. Louis Gas Light Company at Second and Convent streets, and to use them as the main station of the Company, to be known as station A. Station B is the works of the Laclede Company, on Main and Howard streets. Station C is to include the two gasholders at 14th and Gratiot streets, and station D includes the new holder at Evans avenue and Sarah street.

MR. JAMES HOOPER, who had been Superintendent of the Media (Pa.) gas works for a number of years, has been incapacitated for duty because of ill-health.

SOME time ago we noted the incorporation of the Plattsburgh (N. Y.) Light, Heat and Power Company, which was formed for the purpose of consolidating the present gas and electric light interests of the place. The gas interest predominates in the amalgamation. It is probable that the gas plant will be transferred to the electric lighting station.

IT IS estimated that an expenditure of $200,000 will be made this year by the Gas Bureau of Philadelphia in main extensions.

IN 1852 the San Francisco (Cal.) Gas Light Company charged $15 per thousand cubic feet for gas; now the ruling rate is $2. During the past year a marked increase took place in the use of gas for purposes other than lighting.

AMONG the matters to be considered at the coming annual election at the stockholders of the Edison Electric Illuminating Company, of this city, will be a proposition to increase the capital stock from $2,500,000 to $4,500,000; also, to create a mortgage to secure a series of bonds on the present "and certain future property of the Company." The meeting will be held on the 28th inst.

SOME complaint has been made of late in Philadelphia about the poor quality of the gas that is being supplied to consumers, which is in direct conflict with the daily reports made at the works. These latter determinations go to prove that the quality of the Quaker City gas was never better than now. It is likely, however, that those who complain are consuming gas through undersized services and imperfect burners. Another reason, perhaps, and a good one, too, is that the main system in several districts of the city is all too small for the drafts that are being made upon it.

THE ordinance introduced in the St. Louis House of Delegates by Mr. Stone, under which it is proposed to regulate gas rates in the city, is as follows: "For a period of five years from and after the passage of this ordinance the price of illuminating gas in the city of St. Louis to consumers shall not exceed 90 cents per 1,000 cubic feet on all bills paid within 5 days after the presentation thereof, and 95 cents per 1,000 cubic feet on all bills paid after the expiration of 5 days from presentation, and for said period of years in said city the price of gas sold to consumers to be used for fuel and power purposes shall not exceed 45 cents per 1,000 cubic feet on all bills paid within 5 days after presentation, and 50 cents per 1,000 cubic feet on all bills paid after the expiration of 5 days from presentation." The Stone measure evoked a lively discussion, which terminated in its indorsement by the House. The ordinance now goes to the Council for concurrence. Mr. Stone, in arguing in support of his pet project, admitted that it was very uncertain whether the price of gas could be so fixed, but he thought it would be well to pass the ordinance, and then permit the courts to define it. Mr. Stone could give Dogberry points.

SENATOR HAYS has introduced to the notice of the Kentucky Senate an Act to amend the charter of the Louisville Gas Company, empowering the latter to supply electric currents. The City Council of Louisville recommends the adoption of the Act.

AS the result of a recent shipment of Breckenridge cannel, by Messrs. Perkins & Co., of this city, to Rio de Janeiro, that firm has just contracted with the Gas Company at that port for the delivery of 5,000 tons of Breckenridge during the next six months. Messrs. Perkins & Co. have chartered a vessel which will clear from Newport News next month with the first installment (1,600 tons) on account of the contract.

THE annual meeting of the American Society of Civil Engineers was held at the House of the Society on the 15th and 16th inst. The meeting was in every way successful.

JUDGE COLT, in United States Circuit Court, for the Massachusetts district concerned, recently heard argument in the case of the Lynn Gas Light Company *vs.* Aaron S. Higgins, *et al.* This was a libel in admiralty brought by the owners of the schooner Calvin P. Harris to recover compensation for damages sustained by that schooner in the channel leading to the dock of the Company, September 1, 1885, as the vessel was making her way to discharge a cargo of coal on the wharf of the Company. The damage to the schooner was caused by grounding on a bar that had formed across and in front of the dock, and which the libellants assert, in respect to its existence and dangerous state, should have been known to the respondents. The latter denied that the vessel was staunch and strong, and not only so, but that it was weak and unfit to carry the cargo on board. They also denied that they maintained the channel; neither did they require the Harris to pass through it. They did not know of the existence of any hard or dangerous bar at the point mentioned, and alleged, if the master of the vessel knew if any sand or earth had worked into the channel, that the respondents had no knowledge of such state of affairs. Further, that the damage was the result of the negligence and lack of skill of the parties in charge of the vessel. The District Court found damages amounting to $4,750.

THE proprietors of the Galesburg (Ills.) Gas Light and Coke Company have issued the following notice: "As it has been our custom to reduce the price of gas about every three years, we now announce the following changes in the schedule: For gas consumed after April 1st, 1890, the price will be reduced from $2.50 to $2 per 1,000 cu. ft., with following discounts when 1,000 cu. ft. or over are consumed on one or each meter per month, providing the bill is paid on or before the 15th of each month:

Discount Rate.	Monthly Consumption.
20 cents per 1,000	1,000 to 3,000
40 " "	3,000 " 10,000
50 " "	10,000 and over,

making net rates of $1.50, $1.60 and $1.80 per 1,000, which gives the people of Galesburg gas at a lower price than is customary in cities of this size. We make this price to induce a more general use, not only for light, but for cooking, heating, etc. It is our intention to offer great inducements to housekeepers to use gas stoves as soon as the season arrives."

THE amended fuel gas ordinances offered for consideration by Messrs. A. A. Woods and L. E. Lemaire to the New Orleans City Council have been indefinitely postponed.

AT the annual meeting of the Peoples Gas Light and Coke Company, of Cleveland, O., the following Directors were chosen: George H. Warmington, Chas. McNeill, M. A. Hanna, R. P. Rhodes and Belden Seymour, Jr.

THE Bloomfield (N. J.) Town Committee has awarded to the Montclair Gas and Water Company a contract for the public lighting. Under its terms the Company is to maintain a stated number of gas lamps (3-ft. burners), the same to be lighted every night until 1 A.M., at a charge of $16 per lamp per annum.

MR. J. M. GLICK has been elected Secretary of the Girardville (Pa.) Gas Company.

AT the annual meeting of the stockholders of the White Plains (N. Y.) Gas Light Company, the following officers were elected: President, Samuel Conover; Vice-President, J. T. Chesborough; Treasurer, Samuel R. Pullen; Secretary, E. R. Phelps. The capital stock is to be increased to $150,000, the increase to be devoted to plant enlargement.

THE Macomb (Ills.) Electric Light and Gas Company has been incorporated by Messrs. Chas. Ketteron, H. W. Cummings and J. N. Rume. Capitalized in $25,000.

THE Poughkeepsie (N. Y.) Gas Light Company offers to perform the public lighting (on an all-night schedule) at the rate of $20 per lamp per annum.

THE proprietors of the Herkimer (N. Y.) Gas Company announce a reduction in the sales rate to $2 per 1,000 cubic feet.

MR. SIMON O. DALRYMPLE, who had been a Director in the Salem (Mass.) Gas Light Company for many years, died on the 12th inst.

Corrosion.

The *Locomotive* says that the purest water often is the most active in corroding and pitting plates, and this makes it probable that the active substance, in some cases at least, is air. It is well known that water is capable of dissolving a considerable amount of air; in fact, it is this dissolved air that enables fish to breathe. It is not so widely known, however, that the oxygen of the air is more soluble than the nitrogen. If a small quantity of water be shaken up in a bottle it dissolves some of the inclosed air, and when this is afterward driven off by boiling and analyzed, it is found to consist of oxygen and nitrogen in the proportion of 1 to 1.87, instead of 1 to 4, as in the natural air. Thus the dissolved air, being more than twice as rich in oxygen as common air is, and being brought into more intimate contact with the metal by means of the water that holds it in solution, exerts a correspondingly more noticeable effect.

It is probable, too, that water plays some other important action in connection with the oxidation of metals, for it has been found by recent experiments that pure oxygen will not combine with things that it has the greatest affinity for, provided it is perfectly dry. Even the metal sodium, which has an intense affinity for oxygen, may be heated in it to a very high temperature without combination, provided sufficient precautions are taken to exclude the slightest trace of moisture. It appears, therefore, that water plays a most important part in the oxidation of metals by air—a part, indeed, that we cannot explain, and that we really know but little about.

Advertisers Index.

GAS ENGINEERS. Page

Jos. R. Thomas, New York City ... 92
Wm. Henry White, New York City ... 97
Wm. Mooney, New York City ... 92
William Gardner, Pittsburgh, Pa ... 92
Fred. Bredel, N. Y. City ... 91

GAS AND WATER PIPES.

Gloucester Iron Works, Phila., Pa ... 92
Mellert Foundry and Machine Co., Reading, Pa. (John Fox, Selling Agent, N. Y.) ... 92
Ohio Pipe Co., Columbus, Ohio ... 92
M. J. Drummond, New York City ... 92
R. D. Wood & Co., Phila., Pa ... 94
Warren Foundry & Machine Co., New York City ... 92
Donaldson Iron Co., Emaus, Pa ... 92
Dennis Long & Company, Louisville, Ky ... 92
A. & W. S. Carr Co., New York City ... 82

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd & Sons, New York City ... 95
Continental Iron Works. Greenpoint, L. I ... 95
Delly & Fowler, Phila., Pa ... 95
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 83
Stacey Mfg. Co., Cincinnati, Ohio ... 95
Bartlett, Hayward & Co., Baltimore, Md ... 93
Morris, Tasker & Co., Limited, Phila., Pa ... 93
Davis & Farnum Mfg. Co., Waltham, Mass ... 83
R. D. Wood & Co., Phila., Pa ... 94
Bouton Foundry Co., Chicago, Ills ... 95
Smith & Sayre Manufacturing Co., New York City ... 95
Fred. Bredel, N. Y. City ... 91
United Gas Improvement Co., Phila., Pa ... 85
Henry Pratt & Co., Chicago, Ill ... 91
National Gas Light and Fuel Co., Chicago, Ills ... 86
Simpkin & Hillyer, Richmond, Va ... 81

PROCESSES.

National Gas Light and Fuel Co., Chicago, Ills ... 86
Bartlett, Hayward & Co., Baltimore, Md ... 93
Wm. Henry White, N. Y. City ... 97
United Gas Improvement Co., Phila., Pa ... 85
Henry Pratt & Co., Chicago, Ill ... 91

INCLINED RETORTS.

Laclede Fire Brick Manuf'g Co., St. Louis, Mo ... 51

GASHOLDER TANKS.

W. C. Whyte, New York City ... 86
J. P. Whittier, Brooklyn, N. Y ... 81

GASHOLDER PAINT.

The Government Waterproof Paint Co., Boston, Mass ... 81

RETORTS AND FIREBRICK.

J. H. Gautier & Co., Jersey City, N. J ... 90
B. Kreischer & Sons, New York City ... 90
Adam Weber, New York City ... 90
Laclede Fire Brick Manuf'g Co., St. Louis, Mo ... 90
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y ... 90
Borgner & O'Brien, Phila., Pa ... 90
James Gardner, Jr., Pittsburgh, Pa ... 90
Henry Maurer & Son, New York city ... 91
Chicago Retort and Fire Brick Co., Chicago, Ills ... 90
Baltimore Retort and Fire Brick Co., Baltimore ... 90
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo ... 90

SCRUBBERS AND CONDENSERS.

G. Shepard Page, New York City ... 52
R. D. Wood & Co., Phila., Pa ... 94

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md ... 93
Fred. Bredel, New York City ... 91
Chicago Retort and Firebrick Co., Chicago, Ills ... 90
Wm. Henry White, N. Y. City ... 97
J. H. Gautier & Co., Jersey City, N. J ... 91

GAS GOVERNORS.

Connelly & Co., New York City ... 87
Fred. Bredel, N. Y. City ... 91
Friedrich Lux, London, England ... 80

SELF-SEALING MOUTHPIECE DOORS.

Smith & Sayre Mfg. Co., New York City ... 91

TAR AND CARBONIC ACID EXTRACTOR.

Geo. Shepard Page, N. Y. City ... 84

PURIFYING MACHINES.

C. & W. Walker, London, England ... 18

CEMENTS.

C. L. Gerould & Co., Brooklyn, N. Y ... 90

GAS ENRICHERS.

Standard Oil Co., Cleveland, Ohio ... 96

GAS METERS.

John J. Griffin & Co., Phila., Pa ... 98
American Meter Co., New York and Philadelphia ... 99
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa ... 99
Helme & McIlhenny, Phila., Pa ... 99
D. McDonald & Co. Albany, N. Y ... 96
Nathaniel Tufts, Boston, Mass ... 98
Maryland Meter and Manufacturing Co., Baltimore, Md ... 98
John Hillen, Brooklyn, N. Y ... 98

EXHAUSTERS.

P. H. & F. M. Roots, Connersville, Ind ... 94
Smith & Sayre Manufacturing Co., New York City ... 95
Wilbraham Bros., Philadelphia, Pa ... 87
Connelly & Co., New York City ... 87

GAS COALS.

Penn Gas Coal Co., Phila., Pa ... 97
Perkins & Co., New York City ... 96
Newburgh Orrel Coal Co., Baltimore Md ... 97
Despard Coal Co., Baltimore, Md ... 97
Chesapeake and Ohio R. R. Coal Agency, N. Y. City ... 97
Westmoreland Coal Company, Phila., Pa ... 97
J. & W. Wood, New York City ... 96

CANNEL COALS.

Perkins & Co., New York City ... 96
J. & W. Wood, New York City ... 96

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y ... 88
John McLean, New York City ... 88
Chapman Valve Manufacturing Co., Boston, Mass ... 88
R. D. Wood & Co., Phila., Pa ... 94
A. & W. S. Carr Co., New York City ... 82

GAS ENGINES.

Schleicher, Schumm & Co., Phila., Pa ... 68
Clerk Gas Engine Co., Phila., Pa ... 88
Van Duzen Gas Engine Co., Cincinnati, Ohio ... 88

ENGINES AND BOILERS.

Jarvis Engineering Co., Boston, Mass ... 87
Ball Engine Co., Erie, Pa ... 81
Westinghouse Machine Co., Pittsburgh, Pa ... 87

GAS LAMPS.

G. Shepard Page, New York City ... 88
Standard Gas Lamp Co., Phila., Pa ... 81
Welsbach Incandescent Gas Light Co., Phila., Pa ... 82
The Siemens-Lungren Company, Philadelphia, Pa ... 82

PURIFIER SCREENS.

John Cabot, New York City ... 88
Bartlett, Hayward & Co., Baltimore, Md ... 88

GAS STOVES.

American Meter Co., New York and Philadelphia ... 89
The Goodwin Gas Stove and Meter Co., Phila. Pa ... 100
George M. Clark & Company, Chicago, Ills ... 82

STREET LAMPS.

J. G. Miner, Morrisania, New York City ... 49
Bartlett Street Lamp Man'fg Co., New York City ... 81

BURNERS.

C. A. Gefrorer, Phila., Pa ... 96

STEAM BLOWER FOR BURNING BREESE.

H. E. Parson, New York City ... 88

PURIFYING MATERIAL.

Connelly & Co., New York City ... 87
Friedrich Lux, London, England ... 80
Edgewater Lime Works, Edgewater, N. J ... 80

COKE CRUSHER.

C. M. Keller, Columbus, Ind ... 97

ELECTRICAL APPARATUS.

Wm. Henry White, N. Y. City ... 97

SOLVENTS.

Maas & Waldstein, New York City ... 81

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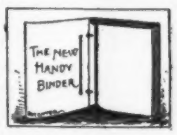

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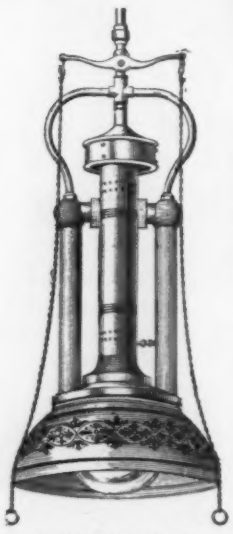

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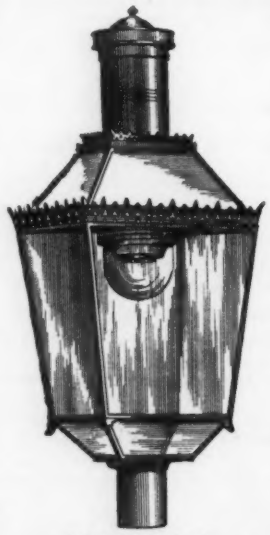

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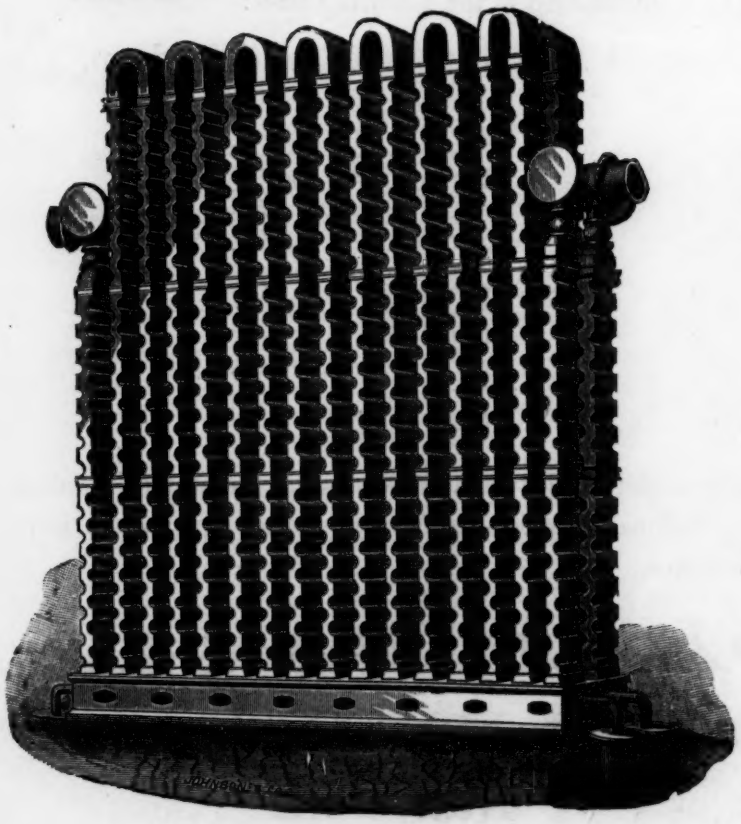

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No. 4,	"	"	500,000	"	"	"	6	"	"	"	"
No. 5,	"	"	750,000	"	"	"	7	"	"	"	"
No. 6,	"	"	1,000,000	"	"	"	8	"	"	"	"
No. 7,	"	"	1,250,000	"	"	"	9	"	"	"	"
No. 8,	"	"	1,500,000	"	"	"	10	"	"	"	"
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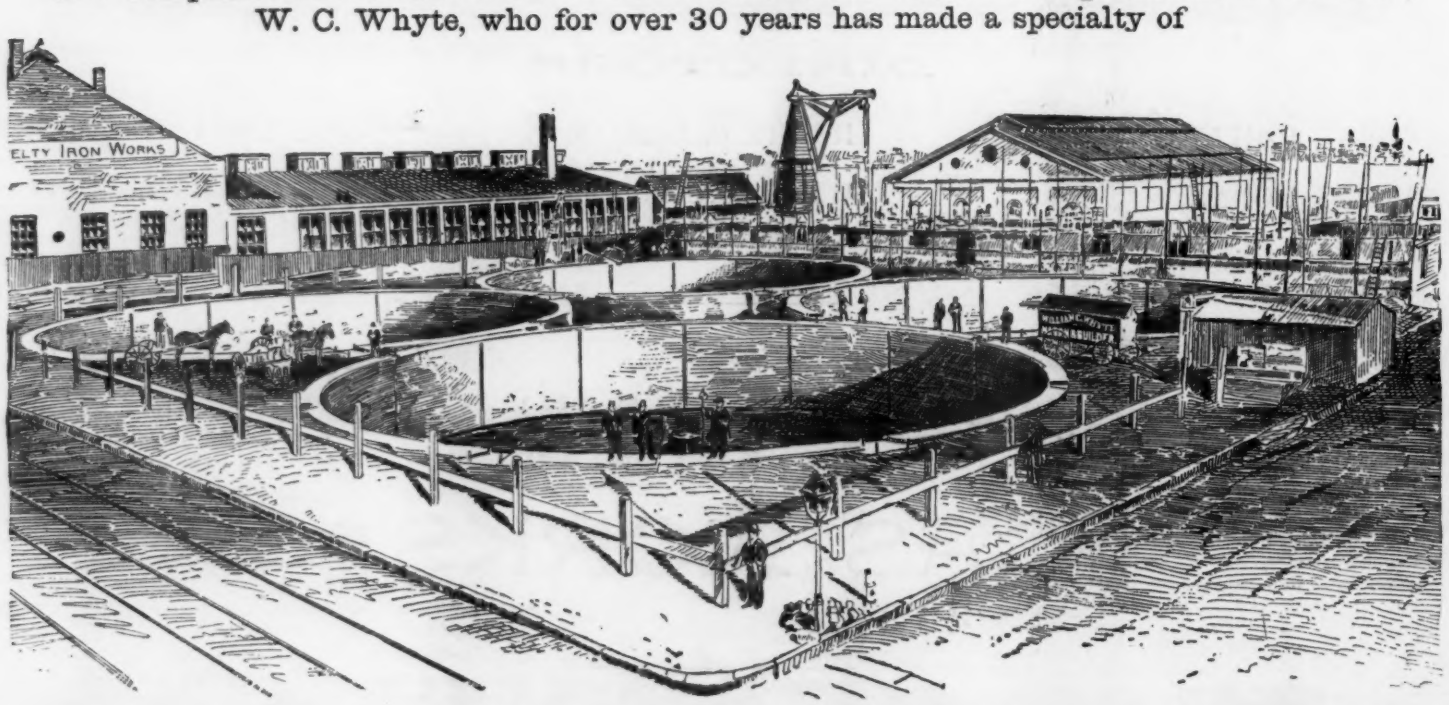

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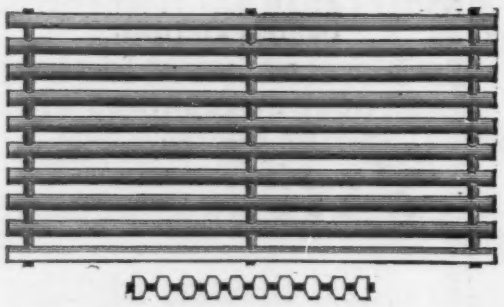

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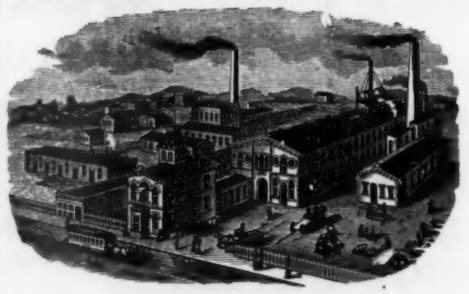

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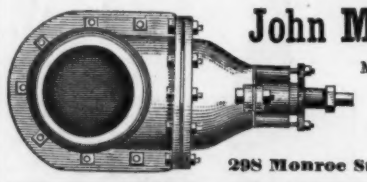

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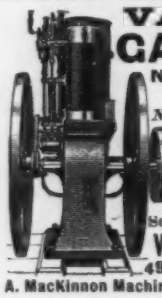

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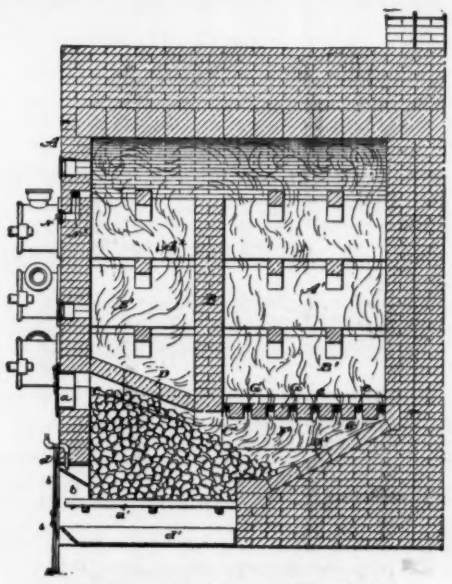

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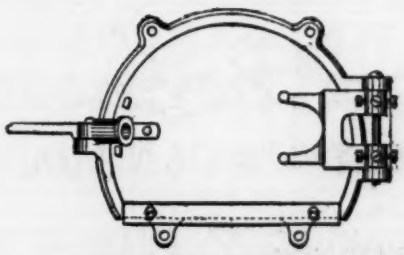

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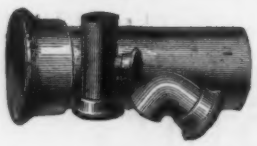

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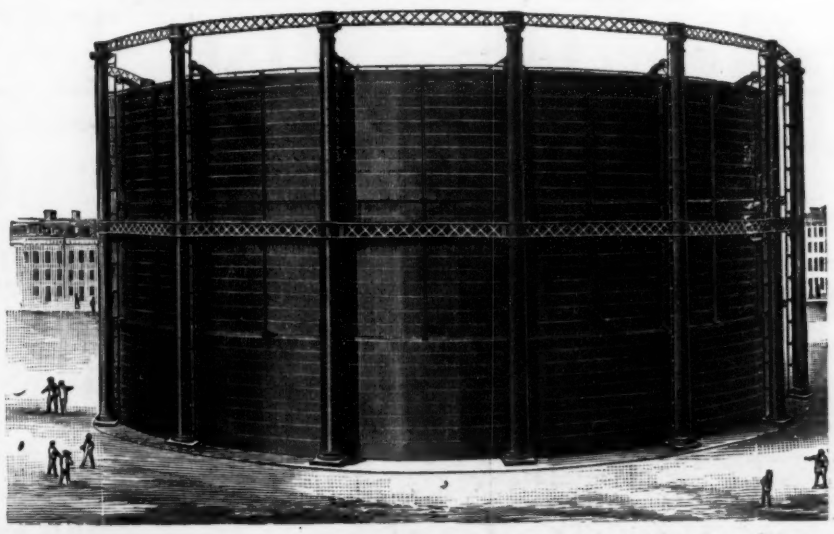

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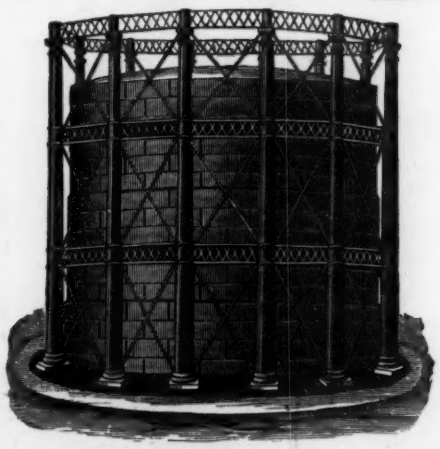

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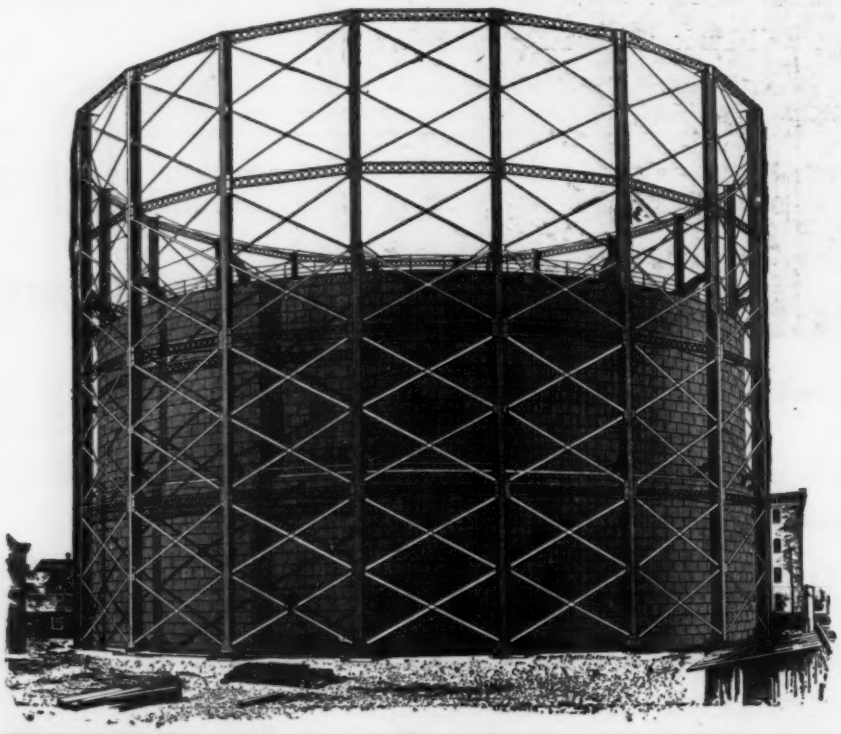

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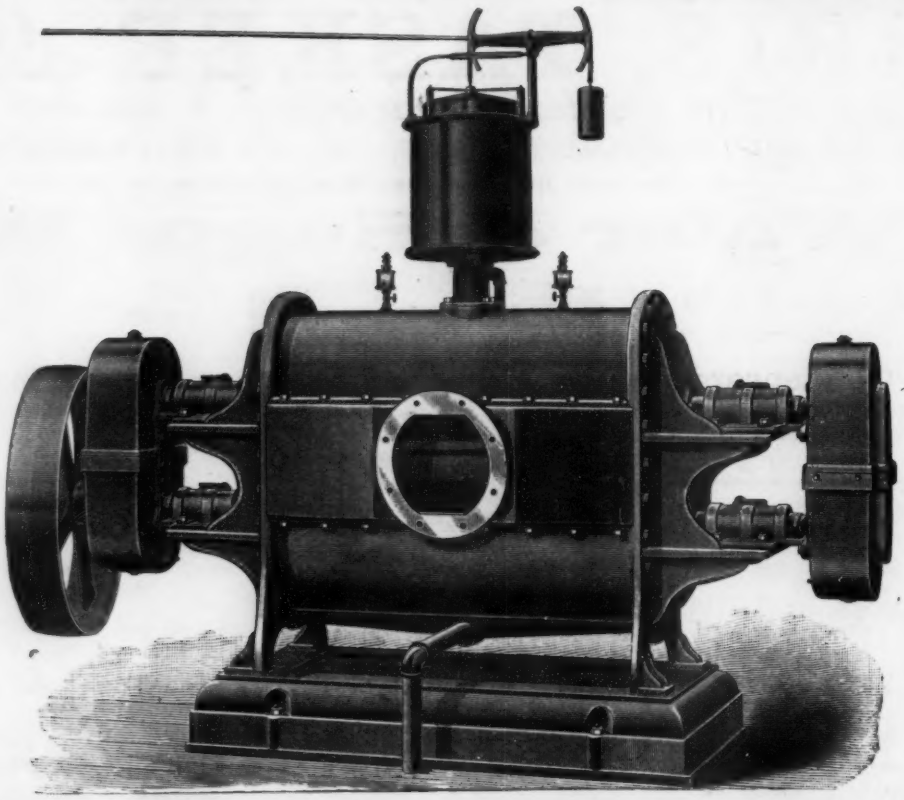

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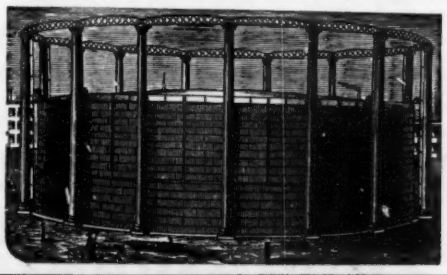

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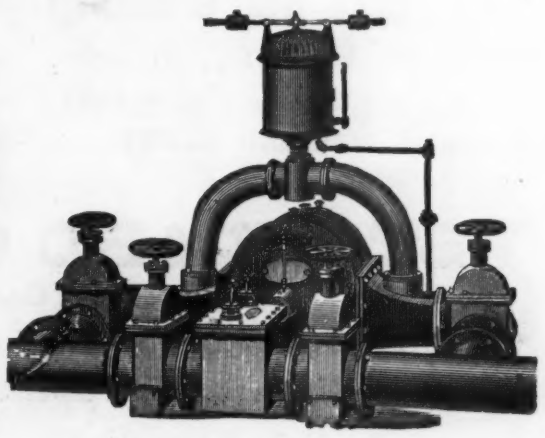

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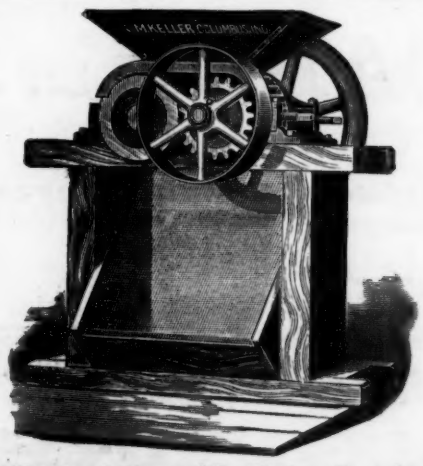

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SIZE.

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37 in. high.	12 in. high.	12 in. high.	24 in. long.	36 in.
20 in. wide.	17½ in. wide.	18 in. wide.	21 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has four burners on top, and double oven burner.

Consumption of gas with all burners in use, 42 feet per hour, at 1 inch pressure.

The top is made in sections, so that a greater variety of cooking utensils may be used. By lifting out the covers and crosspieces and putting in a suitable forked ring, which is sent with each stove, a wash boiler or other large utensil may be set over two burners. Our **No. 87 GRIDDLE** also fits in the same position. The roasting oven is provided with a cast-iron door.

All Fittings are Nickel-Plated.

GAS COOKING STOVE, No. 7 B.

SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
31 in. high.	9⅛ in. high.	10 in. high.	21 in. long.	32 in.
17 in. wide.	14½ in. wide.	15 in. wide.	16 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has three boiling burners in the Top or Hot Plate, and one single oven burner.

This cut represents our New Style Cooking Stove. As will be seen, it has an ornamented cast-iron Base and Front, and extension shelves. The Oven Burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent). The ovens are of greater capacity than those of the old style. The Top, in conjunction with the Outlet Pipe, is designed to carry off all the products of combustion, if desired, but they are also supplied with a loose ring which converts it into an ordinary open top stove.

The consumption of this Stove is 35 cubic feet per hour at 1 inch pressure, with all Burners in use.

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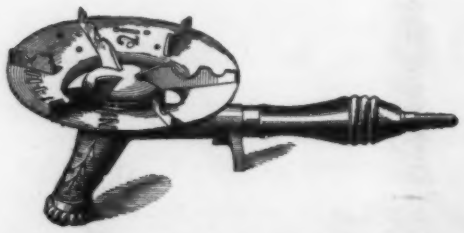

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Size, 36 in. long, 12 in. wide, with three double burners, 6 taps.

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